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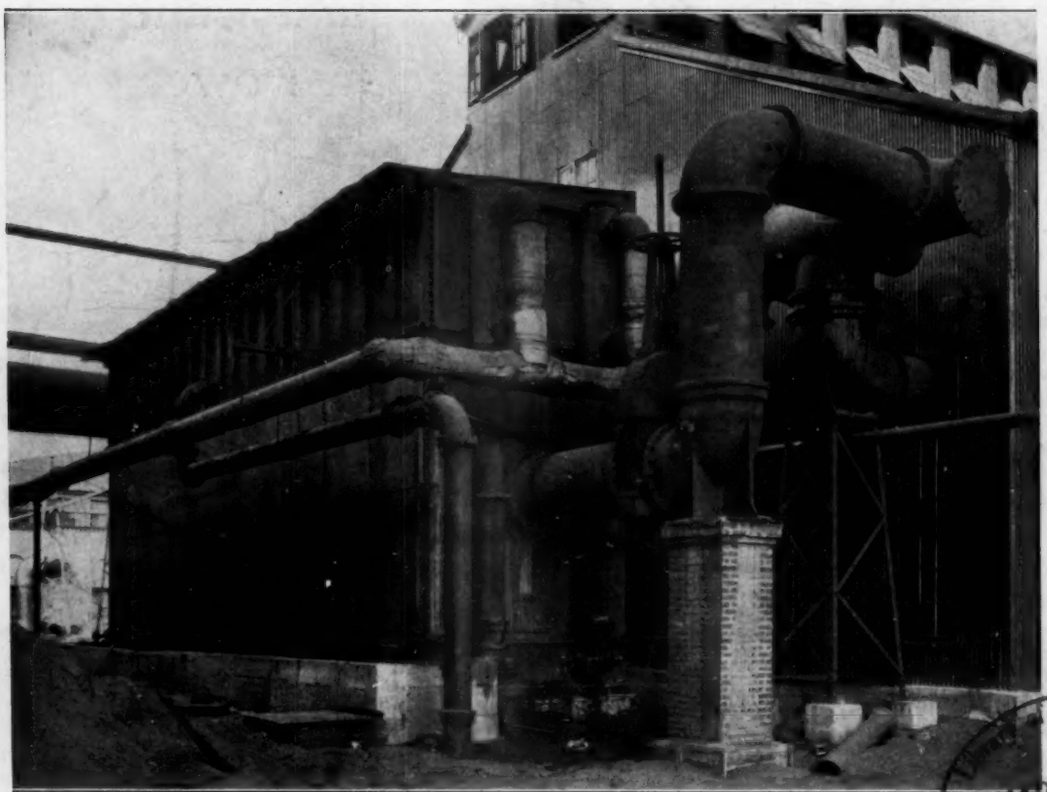

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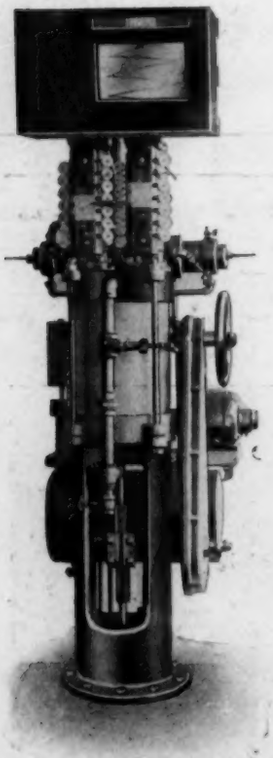
INDEX TO CONTENTS, PAGE 4

ADVERTISERS' INDEX, PAGE 35



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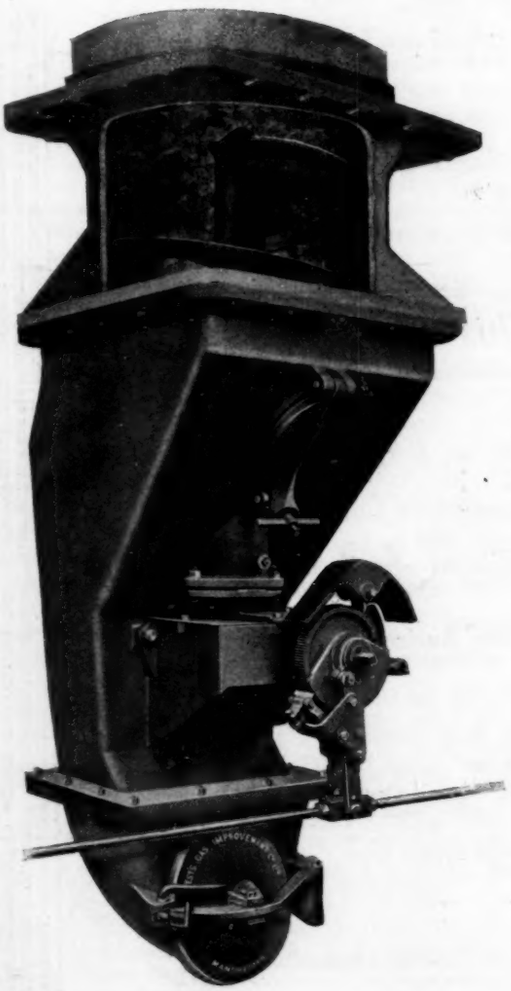

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Contents of This Issue

Bituminous Coal as Generator Fuel—By W. A. Dunkley..... 249

Value of an Accountant—By W. A. Sauer 253

Can "Cub" Reporters Whip Gas Companies?—By H. D. Kemperton 255

One in Eight Has Direct Interest in Utility Business 257

As the "Journal" Views It..... 258
The Coal Situation
Confidence Displayed

Developments in Gas Technology — By Ismar Ginsberg, B.Sc., Chem. Eng. 262

Public Utilities Securities Market Report 264

News of the Gas Industry 265

Personal Notes 271

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Bituminous Coal as Generator Fuel

Each Case a Problem by Itself

By W. A. DUNKLEY, U. S. Bureau of Mines, Urbana, Ill.

The use of bituminous coals, especially coals mined in Illinois and Indiana, for water gas generator fuel, received quite an impetus during the war when coke made from Eastern coals was scarce or unobtainable. Under certain plant and economic conditions the financial saving derived from its use was appreciable even after coke again became plentiful. Many operating difficulties were encountered with bituminous coal. Some of these have been overcome to a great extent, while others seem to baffle, as yet, all efforts to overcome them, with existing equipment. Some of these difficulties will be discussed later in this paper. The feasibility of using bituminous generator fuel in any particular plant must depend upon the existing plant conditions and cost of raw materials. Each case is a problem by itself and no general claims can be made.

This paper, which was presented at the Illinois Gas Association meeting, held last week in Chicago, is based upon co-operative experiments made by U. S. Bureau of Mines, the University of Illinois and the Illinois Geological Survey. The expenses of the writer were paid by the Illinois Gas Association.—Editor.

The purpose of this paper is to set forth an interesting development of use of bituminous coal in water gas manufacture in conjunction with waste-heat boilers. One of the outstanding features of bituminous coal operation in the past has been the large amount of heat carried by the volatile matter liberated from the coal. Part of this was recovered in the blue gas, but a very large part of it was liberated during the blast period in amounts considerably in excess of the requirements to heat the checker work for oil cracking. This excess was totally lost. It has long been realized from results obtained from coke operation in conjunction with waste-heat boilers that much heat could be saved by using the sensible heat of the gas and combustion products to generate steam, but just how much economy could be realized with bituminous fuel by the same means, has been somewhat problematical. The recent waste-heat installation at Joliet, where Illinois coal has been used for generator fuel for more than a year, afforded an opportunity to acquire the desired information.

The gathering of data to constitute a heat balance for any form of installation is a rather difficult proposition. As the term heat balance implies, it is a balance of heat input against heat output, taking some particular temperature as standard. In the present case a temperature of 60 deg. Fahr. was the standard temperature assumed and all heat input and output was measured above this temperature.

The heat survey at Joliet was somewhat complicated by the fact that it was not possible to determine the performance of one particular water gas set with its waste heat boiler separately, since there was no means of measuring the individual gas output or steam production. Therefore, the balance here given is derived from 144 hours of continuous operation with three eleven-foot U. G. I. sets and three vertical waste heat boilers, operating under regular running conditions The conditions during the test were the same as those prevailing during everyday operation. No operating changes were made; so the test run consisted chiefly in observing carefully what conditions ordinarily prevailed and in observing and recording certain factors which were not ordinarily observed in regular operation. In the Joliet installation we have a typical example of continuous operation. The maximum production of gas is just about sufficient to supply the demand when four sets are operating. With only three sets in operation during the test it was necessary to operate the auxiliary plant at Aurora and run the Joliet installation at full capacity; so that a set was shut down during the test period only long enough to clean the fire, or to make some minor repair.

The Joliet installation deserves a brief description, to make operating conditions more understandable. The entire installation consists of four eleven-foot external diameter U. G. I. water gas sets, with the high capacity rating of 3,500,000 cu. ft. of gas each per day, using good coke and forty-two inches blast pressure. Three of these sets can be used at one time in conjunction with

three waste-heat boilers which are arranged to handle both the make gas and the blast gas from the sets. The boilers are so arranged that they can operate with any three of the four sets but when four sets are operating one of the sets must be run without a boiler. The boilers deliver their steam at a pressure of about 125 lb. per square inch to a high-pressure header. This header supplies the turbine-driven blowers and the pumps with steam. Any excess steam goes to the boiler house to supplement that generated by the coal-fired boilers located there. The turbine and pumps exhaust into a low-pressure header where a pressure of about seven to eight pounds per square inch average is maintained. This low-pressure header supplies steam to the sets during the steam run and heats the feed water for the waste-heat boilers. Usually only one turbine blower is used at one time to operate the three sets, since it supplies sufficient air for operation with coal under prevailing conditions. Any deficiency of steam in the low-pressure header is made up by steam from the high-pressure header through reducing valves. It is interesting to note that during the test sufficient steam was introduced from the high-pressure header to superheat the low-pressure steam 34 deg. Fahr.

The sets are operated entirely by hydraulic pressure, through the medium of automatic controls. This system, of course, does much to eliminate the human factor and keeps the length of each part of the operating cycle very uniform. The sets are fully equipped with air and steam meters. Each set is equipped also with pyrometers, one set having a recording pyrometer, the others being of the indicating type. The duties of the operator aside from assisting in coaling the set, consist in watching the gauges to see that the prescribed air, steam and oil requirements are maintained and to change the predetermined cycle temporarily in case he observes that the set temperatures are not being properly maintained.

The fuel for the sets is elevated by a belt conveyor from a track hopper to an overhead bunker, from which it is drawn off into larry cars running on an industrial track parallel to a line through the coal holes of the four sets. Each larry car has a side spout and coal valve. The fuel is distributed over the surface of the fire by a scoop of special design guided by the operator.

The further details of operation of the sets and waste-heat boilers require little special comment, except as they are affected by the nature of the fuel used. The greatest difficulty in operation experienced at Joliet has been the tendency to blow holes through the fire even at relatively low rates of air velocity. The passage of 6,600 cu. ft. of air per minute, which was the average during the test and is considerably less than that possible with coke fuel, formed holes, almost invariably around the circumference of the generator fire. There was a further tendency for the blast to pick up some of the partially coked fuel and carry it over into the checker chambers. Even though the dust collectors were emptied regularly about every three hours and were seldom full before emptying, a large amount of fuel averaging about 10.5 per cent of the generator fuel was swept out of the generator. To avoid clogging the checkerwork very rapidly it was necessary to space the bricks out to about six inches and to clean the bottoms of carburetor and superheater and the connecting tunnels every other day. This cleaning was greatly facilitated by installing a quick opening door on the rear side of each superheater bottom. The coked fuel removed had a heating value of about 11,500 B.t.u. per pound and so could be utilized in the boiler plant. A number of schemes have been tried in the effort to diminish the tendency to blow over fuel but while some of them show a slight tendency to diminish the amount, the problem is not yet solved.

Testing Procedure

As stated before, the method of operation regularly employed was not changed during the test run. The average operating conditions and results are given in Table I.

There were eight special observers on the test and they worked twelve-hour shifts. Observation and tests were made regularly to ascertain the heat input and output. The generator fuel was carefully weighed, average samples were taken daily, and sent to the Bureau of Mines in Pittsburgh for analysis and B.t.u. test. Table II shows source and composition of coals used. The oil used was determined from tank measurements made daily. The oil temperature was determined at intervals throughout the twenty-four hours. A composite oil sample collected throughout the test run was sent to the bureau for test. The boiler feed water was determined by a new Worthington displacement meter, calibrated by weighing water passed through it, before and after the test. All gauges were calibrated before testing by comparison with a dead-weight tester. The amount of moisture in the air blast was also determined but is not included in the balance since the heat carried by it was so small as to be negligible. The same was true of the sensible heat of the coal. The amount of steam to the generators was ascertained by the flow meters and its heat content deduced from the quality and pressure maintained on the low-pressure header, as ascertained by frequent observations.

The heat output was more difficult to allocate because there are at least thirteen different avenues of escape. The heating value of the gas was determined by a recording calorimeter, checked daily by a flow calorimeter. The gas was metered by an electric gas meter. Its accuracy had been previously established to the satisfaction of the company by holder tests and comparisons with other meters.

The amount of undecomposed steam passing the sets was ascertained by passing gas from the top of the superheater through an asbestos-filled scrubber tube, then to a weighed bottle of cold water through which it bubbled, then to a gas meter. Such tests were made several times during the test run on different sets. Each test extended over the period from one coaling to the next and was bubbled only during the actual run period when the stock valve was down. The heat leaving in the undecomposed steam was computed from the average temperature of the gas leaving the waste heat boilers. The average temperatures of make gas and blast gas leaving the boilers were determined by calibrated pyrometers.

The heat of combustion and sensible heat of the stack gases were estimated from various measurements, since the volume of stack gas could not be determined directly. The composition of the stack gas as ascertained from about sixty-five analyses gave the average heating value of the gas by computation. Its carbon content could also be very closely estimated from the analyses. Analyses of fuel charged coke and unburned material removed from the sets, tar produced, together with analyses of the blue gas, made it possible to estimate very closely the carbon content of these constituents. By constructing a carbon balance for the generator alone, the difference between the carbon in the fuel charged

TABLE I

Operating Conditions and Results During Test Period

Cycle—Blow, 1.9 minutes; blow run, 2 minutes; steam run, 2.63 minutes; air purge, 0.17 minute; up steam run, 1.1 minutes; down steam run, 1.55 minutes.
Coal interval about 7 minutes.

Weight of coal charge, about.....lb.	2,400
Gas made during test.....cu. ft.	28,947,000
Gas made per set per running hour, including coalings and barrings.....cu. ft.	80,800
Gas made per run.....cu. ft.	7,609
Gas made per running hour per square foot grate area.....cu. ft.	1,265
Total generator fuel used.....lb.	1,330,378
Generator fuel per 1,000 cu. ft. of gas made.....lb.	46
Total oil used by tank measurements...gal.	107,305
Oil per 1,000 cu. ft. of gas made.....gal.	3.72
Heating value of finished gas.....B.t.u.	561
Steam to generators per 1,000 cu. ft. of gas.lb.	50.5
Air to generator during blast per 1,000 cu. ft. of gas.....cu. ft.	1,732
Air to generator during blow-run per thousand.....cu. ft.	134
Air to generator during air purge per thousand.....cu. ft.	113.6
Average temperature top of superheater.° F.	1,373
Average temperature bottom superheater.° F.	1,347
Average pressure, low-pressure steam header.....lb sq. in	7.3
Average temperature of low-pressure steam ° F.	267
Average steam pressure on waste-heat boilers.....lb	114
Total feed water to waste-heat boilers....lb.	2,683,387
Equivalent evaporation from and at 212 deg. Fahr.....lb.	2,923,647
Average temperature of feed water.....° F.	122
Boiler hose-power developed.....	588
Average temperature of stack gases.....° F.	956
Average temperature of illuminating gas at boiler outlet.....° F.	726
Tar produced per 1,000 cu. ft of gas....lb.	3.76
Blown over coke removed from sets (dry).lb	138,945
Blown over coke in percentage of coal charged.....%	10.4
Generator refuse recovered.....lb.	122,900
Generator refuse, per cent of fuel.....%	9.2
Average temperature of oil to sets.....° F.	93
Average temperature of air to sets.....° F.	65
Average humidity of air.....%	50
Average heating value of generator fuel per pound.....B.t.u.	12,465
Average heating value of oil per lb....B.t.u.	19,400
Average heating value of tar per lb...B.t.u.	18,050

TABLE II

Analyses of Coal, Blown-Over Coke, and Generator Refuse—Moisture-Free Basis

	[1]Gus Blair Lump	Coke Blown-Over	Generator Refuse	[2]Rex Lump	Blown-Over Coke	Generator Refuse
Vol. matter ..	35.2	1.4	1.6	33.3	1.1	0.8
Fixed carbon.	57.9	79.8	29.3	54.4	81.7	13.4
Ash	6.9	18.8	69.1	12.3	17.2	85.8
B.t.u. per lb...	13,618	11,257	3,885	13,177	11,760	1,975
Sulphur	1.3	0.6	0.4	0.7	0.5	0.1

Ultimate Analysis

	Gus Blair Lump	Rex Lump
Hydrogen	4.9	Received too late for publication.
Carbon	76.8	
Nitrogen	1.7	
Oxygen	8.6	
Sulphur	1.2	
Ash	6.8	

[1]Mined at Murphysboro, Jackson County, Ill
[2]Shipped from Ethel, W. Va.

TABLE III

Average Analyses of Gases

	Finished Gas	Blue Gas Up Run	Blue Gas Down Run	Blown-Run Gas	Air Purge Gas	Blast Gas at Generator	Stack Gas
CO_2	5.4	6.7	4.3	9.5	13.0	14.4	10.2
Ill.	10.9	0.8	0.5	0.4	0.6	0.3	0.1
O_2	0.9	...	...	1.7	2.1	1.5	7.4
CO	21.7	34.4	35.4	12.0	0.7	8.3	1.5
CH_4	15.3	4.8	4.3	1.8	1.4	1.9	1.3
H_2	25.5	49.5	50.6	7.7	0.8	4.4	0.9
N_2	20.3	3.7	4.9	66.9	81.4	71.2	78.6
Calculated B.t.u.							(1)
(2) 556.0 B.t.u. by Cal. 561.0	337.8	334.5	93.7	36.2	67.1	23.2	...

1. This heating value is less than that given in the heat balance, since the latter includes a considerable portion of every blow when no secondary or tertiary air was admitted and consequently there was no combustion.
2. A value of 2,280 B.t.u. per cubic foot for illuminants is assumed.

and in the products directly computed gave, it is believed, a very close estimation of the total weight carbon in the stack gas. From this figure and the stack gas analyses, the volume of stack gas under standard conditions, was computed.

The composition of the gases made in a water gas set are constantly changing so the only way of getting representative analyses is to take many analyses over an extended period, representing as closely as possible all conditions. During the test at Joliet, sixteen gas analyses were made during each twelve-hour shift, 192 in all during the 144-hour run. Of these, one was made each shift on the finished gas when the recording calorimeter showed approximately the average required reading. The remaining analyses were divided quite evenly between blast gas sampled at the generator lid, blue gas, and stack gas. Average results obtained are tabulated in Table III.

The fuel blown over into the dust collectors and checker chambers was weighed, sampled, and analyzed as was also the generator refuse. The sensible heat in these products was determined from their estimated heat capacity at the temperature observed by thrusting a pyrometer into the material before removal from the set. The temperature shown by the coke refuse was 1,100 deg. Fahr. The ash and clinker were assumed to be at the same temperature. This was probably not exactly

true but no appreciable error was introduced by the assumption.

The heat in the steam generated in the waste-heat boilers was readily computed from the observed average pressure, the weight of the feed water, and frequent quality tests with a throttling calorimeter.

The heat carried out by the tar was difficult to estimate because of the difficulty of estimating the amount of tar produced. In the undecomposed steam determination previously described an asbestos-filled tube was used as a tar scrubber. The tube was weighed before and after the test. At the close of the test, air, dried by passing over calcium chloride, was passed through the tube several hours to remove the moisture held with the tar. After the moisture was off the tube was weighed again. Its final weight from the weight before drying gave approximately the amount of water contained which was added to the amount determined in the moisture test and the original tube weight subtracted from the dried weight wave an approximation of the tar. The method is not very exact and therefore no great claims to accuracy are made for it.

The radiation and connection losses are sources of uncertainty in any heat balance, since they are very difficult to estimate. The figures used are based upon data furnished by the United Gas Improvement Company, who estimate that these losses for an eleven-foot water gas set amount to approximately 500,000 B.t.u. per hour and from the connections up to the boiler about 88,000 B.t.u. per hour. They state that by multiplication the losses from any number of units can be estimated.

The summarized heat balance is given in Tables IV*a* and IV*b*, the former summarizing heat input and the latter heat output. It will be noted that after the items are added together there remains an unaccounted for loss of 4.4 per cent. This is not, in our estimation, excessive for a calculation involving so many difficultly obtainable items. In the opinion of the writer, the unaccounted for loss may be occasioned chiefly by errors in items 4B, 5B. 11B and 13B, since these items are for the most part rather large and difficult of exact determination.

Discussion of Heat Balance

From the heat balance as presented, it is interesting to note the relative magnitude of some of the items and the possibilities which the process presents. The first item, 1B heating value of finished gas, represents a little less than 50 per cent of the total heat input. This item, together with items 7B and 11B, a total of about 60 per cent, represent the total heat recovery possible under the existing conditions without the waste heat boilers. In the 1912 Proc. of the American Gas Institute, O. B. Evans, of Philadelphia, presented a heat balance of a water gas set making a 656-B.t.u. gas, using anthracite coal for fuel, in which the recovery in gas and tar totals 76.9 per cent of the heat input. It appears, therefore, that thermally the production of higher quality gas with coke or anthracite fuel is more efficient than production from bituminous coal under ordinary operating conditions, and the extent to which the difference can be made by using waste heat boilers in conjunction with bituminous coal operation will depend upon the efficiency of heat extraction by the boilers.

During the test the waste-heat boilers recovered a little more than 9 per cent of the total heat introduced into the sets. This 9 per cent, however, amounted to about 588 boiler horse-power, or an equivalent evaporation of about 101 lb. per 1,000 cu. ft. of gas made.

Subsequent to the test the management discovered that the turbine cleaner used to clean out the tubes of the fire-tube waste-heat boilers, was made for 3½-inch tubes, whereas the tubes of the boilers were 4 inches in diameter. A layer of carbon approximately one-fourth inch thick therefore remained on the interior of the tubes after using the cleaner. This layer, of course, had a very considerable insulating effect. After securing a cleaner of proper size, it was found that the temperature of the blast gases dropped to 500 deg. Fahr. after cleaning and came up to 560 deg. Fahr. after four days' operation. At the time when this paper was sent to press, no results covering a long period of time were available. If, as seems likely, the tubes can be cleaned often enough to keep the stack temperatures down to 600 on blast gas and 500 on make gas, the heat wasted as sensible heat in the stack gases should be reduced to about 44,150 B.t.u. and the sensible heat in the make gas to about 10,470. If the saving represented by these decreases is realized in the steam production, this should increase to about 122 lb. per thousand cubic feet of gas made, an equivalent evaporation of about 135 lb. from and at 212 deg. Fahr. The boilers should develop about 785 boiler horse-power, and the heat recovered in the boilers should become about 138,300 B.t.u., or 12 per cent of the heat input to the sets.

A further inspection of the heat balance shows some further possibilities. Especially in item 5B there seems room for improvement. The combustion of the blast gases was seldom complete. This was indicated not only by the many analyses made during the test but also by the smoke which was usually visible and often very dense. Part of this loss of combustible gases was occasioned by the operating cycle used. For about 17 per cent of the blasting time no secondary or tertiary blast (introduced at the top of the superheater) was used. While it is necessary to have some time interval elapse between the admission of primary air and secondary and tertiary air, it seems likely that this interval might be somewhat reduced with safety. Even with secondary and tertiary air on, the analyses showed almost invariably, the presence of both oxygen and combustible constituents in the stack gases and, while an error in gas analysis might have been responsible occasionally, we cannot believe that this was universally true. There are indications that the mixing of air and blast gas was not perfect and that despite an excess of air present almost always, the combustion was not complete. The writer believes that an installation designed expressly for coal should have a fairly large combustion chamber interposed between the superheater and the boiler. With complete combustion, the additional heat available for absorption might justify a double-pass boiler. With complete combustion, and absorption of heat down to 600 deg. Fahr. in the stack gases, the possibilities for steam generation appear to total nearly 1,500 boiler horse-power from the three boilers.

Another considerable source of heat loss is item 2B, the heat carried out of the boilers by the undecomposed steam. From the standpoint of coke or anthracite operation, this is very excessive, being about twice that considered good practice. The reason for using such an excess of steam is to counteract the overheating in the top of the generator due to holes in the fire and secondary combustion in the generator. During the test run the steam to the sets was reduced for a few hours,

(*Continued on page* 260.)

Value of an Accountant*

Where He Fits in Your Organization

By W. A. SAUER, Comptroller, The Peoples Gas Light & Coke Co., Chicago, Ill.

Years ago, in a gas company, no one knew anything about the company's figures except the bookkeeper; his immediate superior (who may have had any one of a dozen appropriate titles) had a general knowledge, and one or two of the officers of the company had a superficial idea of what the arithmetical facts indicated. Times and conditions have changed; coming down closer to the present day we find that figures have spread their influence, the industry has profited, progress has been made. Many obstructions to development and efficiency, accumulated through obsolete methods and unprogressive individuals, have been eliminated by being exposed through the advance made in accounting practice.

Mr. Sauer in this splendid paper points out the value of an accountant in a gas company. His remarks should certainly drive home the truth to any doubtful one. You will find this paper most interesting.—Editor.

The gas industry, however, up to the present has not availed itself of all that figures may bring out. The larger companies make extensive studies of their figures, but have not reached that same state of thoroughness that is observed in other industries. The standardization and completeness of operating costs in the steel industry is noteworthy—they apply to each of the various processes of production. The same consideration is given to the investment cost. Every business man should realize that a dollar invested should receive the same attention and care that is given a dollar in the bank or in the cash drawer. The careful consideration that has been given to accounting by the steel industry and the thoroughness with which it has been applied is one of the most effective factors in making that industry the power that it is to-day. To the scientific development of operating and production costs, construction costs, overhead costs, depreciation, amortization, revenue and surplus—to all that those accounting terms signify can be placed a large part of the credit due for the tremendous industrial development of the past twenty years.

The executive who has no accounting knowledge or is without the help of an able accountant (I do not mean a bookkeeper) cannot be successful. At the last convention of the American Gas Association, held last fall, I heard three speakers tell what was wrong with the gas industry. The opinions expressed can be summarized briefly as follows: The industry was not progressive because it appeared to accept its growth as a natural development; initiative was not encouraged—it was not required; and the future was too far ahead—it would take care of itself. My own opinion would not be at great variance with theirs, but my remedy would be more specific in one respect, and that would be a more general observation of modern accounting practice, particularly in other industries. Modern accounting practice was almost negligible in the gas industry until the event of commission regulation, when it was introduced by the commission in most instances and not by the companies.

In criticising the past I wish to bring out this point: all forms of business in the days I refer to kept accounts, but compared with to-day their methods were rudimentary. The development of accounting science as applied to the gas industry was noticeably slower than in other utility service organizations. The excuse has been offered that the extraordinary development of other forms of public utility service left the gas business stagnant. I do not think that is the answer. The distribution and sale of gas has shown a remarkable increase in the last decade, but it has developed from the outside; in other words, the demand came unsolicited and close attention to details was not required, and was not given. To-day the gas industry is making progress; it is awakening. The future holds great promise—where gas was used for one purpose twenty years ago, it is used for one hundred to-day. Fields for great consumption are just being developed. As the industry develops, what is the call of its experts? All demand figures—costs to determine what can be done to compete, statistics for comparison and for study to meet requirements and conditions, procedures and routines to make for efficiency.

As accounting developed it unfolded fields for specialization—it called for close analysis of figures. Was the statement submitted what one wanted it to represent? Was it the true and desired fact? To make it so the trained statistician became a recognized authority. He is a specialist fundamentally an accountant. As analyses of unsatisfactory conditions

*Paper read at annual meeting of Illinois Gas Association.

were made, analyses that were developed from figures to get facts, it was found that another expert was needed, a specialist also, an efficiency engineer. He replans organizations, perfects routines, devises systems; and while sometimes his efficiency is disputed, nevertheless he is a modern big-business necessity, and he is primarily dependent for basic facts to accomplish successful results; his work develops from what the accountant shows should be corrected. The foregoing claims a great responsibility for the accountant, and creates the impression that he is a very important part of an organization; and that is exactly the impression I desire to create, for the reason that some people in the gas business still think he is a bookkeeper, which he is not.

What an Accountant Must Be

Accounting is recognized as a profession because the accountant must be able not only to produce clear, intelligent and properly defined revenue and cost results, but he must have statistical training in order to diagnose an unsatisfactory result. He must be able to plan or suggest routines that are effective not only in producing accounting results but in producing efficient and economical service. This is accounting as it is taught and as it is practised by those who know their profession. In order to qualify the accountant must have a thorough knowledge of accounting theory as well as practice, and have a fundamental knowledge of financial and legal commercial procedure.

Why all this setting forth of what a wonderful fellow the accountant is? How did you ever get along without him? You did not; your success was forced on you; you had something the public needed, and what progression was made was what necessity enforced. The gas industry has reached the point in its development where it has need for the accountant. It has great need for other specialists, but the need of those specialists is usually made apparent by the work of the accountant.

Take the accountant in whole-heartedly; let your whole organization recognize his place. He does not want to tell your production engineer how to produce gas, but he will tell him how much the most minute part of the operation of producing gas costs, and also how to compare the effort and material required for that operation with the cost. This is his job—to cooperate and help the other fellow solve his problems. But don't forget, he needs co-operation also, and the lack of it in years gone by was one of the hardest obstacles the accountant had to contend with. He was a nuisance to most of the operating men and to a great many others, and you run across somebody occasionally to-day who still feels that way.

Every big industry in this country, without exception, has an association of accountants, whose sole efforts are to perfect effective standardization of accounting systems, routines and costs. Their publications, minutes and results are given the closest attention by every organization they represent, executives, operating superintendents and foremen alike, because big business is run by figures.

The American Gas Association has an accounting section that is making a determined effort to make itself felt, but it finds difficulty in interesting those who feel their interests lie in other fields. Standardization of costs and other accounting procedure for the industry is almost negligible throughout the country. When a committee of the accounting section of the association is being formed, it is with difficulty that company representatives are found who evince any decided interest in the outline of work. Some of the State organizations have State representatives who serve; beyond that I doubt if any of the State associations specialize in any way in accounting. It should not be so. Commission regulation demands that closer observance should be given to the subject. The rate structure that guides many commissions in their findings is based completely on costs. It is safe to assume almost every man here has had some experience in a rate case before a commission, and therefore knows what importance is placed on operating costs and fixed charges.

Investment Costs an Important Factor

Investment costs are another most important factor in commission regulation. How closely does your book cost represent what should constitute that charge from an accounting viewpoint? Can an engineer tie in his appraisal with your investment record, or will the lawyer be supported in his claim for a fair value by what your books of record show your property to be worth? What effort or thought do you give toward keeping a perpetual inventory of your capital charges? The easiest part of your value you check very carefully—your cash. Your big value—your plant investment—will take care of itself, perhaps. Give it a little thought and then ask the accountant to straighten you out. How about your other inventories—supplies and merchandise? Are your methods up to date? Do they meet all income-tax requirements? Check up and then ask the accountant. What about consumers' accounting? Are you satisfied with your system? Very few of the companies are. Look it over, and then ask the accountant. Check over your method of charging out materials and labor. Are they accurate? What about overhead expenses? How do you distribute them? Your income-tax return? Oh, yes; we have an accounting firm come in and take care of it. Do they ever suggest anything?

And last, but far from least, the annual report; that part of it that tells how much was made or lost, and the balance sheet. Do those statements tell a concise, clean, understandable story? It is very important they should. A great many of the utility companies are going before the public, to the small investor, and asking him to entrust his savings to their care. Your statements of your worth must never be questioned. Gain the confidence of the man seeking to make a small investment and a great many of your problems of the past will be solved. The accountant can help you.

Oil Reserves

An investigation is being made by the Bureau of Mines of physical and mechanical conditions affecting the production of petroleum. Among these are the effect of depth and thickness of the producing sands, spacing of wells, and the use of vacuum on production. It is believed that more knowledge on these subjects will enable closer estimations of the recoverable reserves of oil. A bulletin covering this investigation will be published later.

Can "Cub" Reporters Whip Gas Companies?

A Few Instances That Will Make You Think

By H. D. KEMPERTON

Every time I see a gas company starting an "educational" or "good-will" campaign in a middle-sized city I wonder just how much the officials of the company themselves are doing to offset it. You'd know just what I mean if you'd been a reporter on a daily paper in one of these cities and had seen gas company "executivitis" slowly build up ill-feeling against the company itself.

Take the case of Jones—that's always a good name to disguise the real individual. He was general manager of the gas company in a city of 75,000 and came onto the job just when the company was after a new twenty-year franchise. Within three months almost every newspaper man in the town was "down on him." Yet he had committed no overt act against them. Probably he never knew how he had prejudiced them. Nor that this prejudice played its part in his removal in less than a year.

The first thing this general manager did was to issue an order that no information should be given to reporters, except by himself. Up to that time the busy reporter could scurry in and get the few minor items from different department heads and be on his way. And he *had* to be on his way. He had a dozen or more offices to visit before 5 o'clock. It called for leg-work; in fact, that group of assignments was known as the "racehorse" run. Ordinarily there was little news in any of the places visited, but a stern city editor demanded that the "cub" see them regularly every day.

This gas company manager let the reporters cool their heels for a half to three-quarters of an hour. Then, when they were ushered in he would inform them curtly that there was no news that day. Because of this delay the reporter would likely miss some other office. And the next morning the rival paper would have some item from the office that the reporter had been forced to skip because of the gas company man's selfishness. The call-down from the city editor caused the young reporter to go among his fellows and curse the gasman long and bitterly. In a short time the gas official had a reputation in all three newspaper offices of "being a crab." From that it was an easy step to the newspaper men, with their freemasonry, believing that such conduct showed bad management and lack of consideration for other people. The next stage was a belief that the policy of the gas company was the proverbial one of "the public be damned."

Then something happened that displeased the none-too-conscientious owner of one of the papers. Maybe it was a difference over a gas bill or neglected service in one of the linotype departments. At any rate, the "match was touched off." Reporters assigned to "take a fall out of the gas company" went to it with a will. The public was sure the gas company was gouging it. Complaints poured in upon the company. Gas employees soured under the strain. The people went to the newspapers with their stories. Ill-will against the company grew like a rolling snowball. What a fine time to get a new franchise! The only thing to do was to get the head of the general manager. The owners of the property did.

His successor had come up from the ranks. He knew these young reporters, appreciated their problems and did all he could to help them. He had the door of his office practically open to them at all times. If he was in conference with somebody he sent out word that he had nothing that day. Or that he would call the reporter—he always knew the reporter by name—at the office in the evening. Thus the reporters always felt sure that they would be protected on anything that developed with the gas company. They knew that, if necessary, they could get hold of the general manager almost any time day or night. Goodwill for the general manager—and the gas company—grew almost as fast as the ill-feeling had done. Newspaper men began to circulate the fact that "Smith over at the gas company was a live-wire and that he'd probably straighten things out." But it was quite a while before Smith was able to straighten out the results of Jones' administration and get a satisfactory franchise. And perhaps co-operation with the "cub" reporters might have prevented all the difficulty.

Handling the Reporters

You should have seen how Smith handled these reporters. New ones were coming along all the time, because if they were any good they were not kept on such barren assignments as gas company offices. The good ones went up—to covering courts and city councils and the city hall. In course of time Smith had a bunch of friends among the older newspaper men, who could be relied upon to try to give the gas company a fair deal.

A "cub" reporter was brought in and introduced to Smith one day when I chanced to be in his office. The youth who had been "covering the gas company" was moving up a step. Smith talked newspaper business to the new "cub." Rather he interviewed him and got the youngster to telling of his limited experience in a country town and of his ambition. Smith was really interested. He had seen where his interests and those of a young reporter could meet, and in studying it over had developed a genuine liking for the hard-working boys. And from this study had come a policy that was profitable both to Smith and to the gas company.

This subject of public utilities holding good-will through the "cub" reporter recalls an experience of a boy who within a few years has become one of the well-known newspaper men at Washington—one who is high in the confidence of public men. Just a few years ago he was a "cub" reporter on an afternoon daily in a Middle Western city. There had been a

wreck on an interurban trolley line. "We're not against the interurban company, Brown," said the city editor, "so don't play up your story. Run out to Hallville and get a list of the injured. Phone in for the first edition." Brown reached the scene of the wreck and got most of his details. It really was not a bad wreck, and Brown reflected that he would be lucky if he got a top column head on page 1. A regular train picked up some of the injured. Brown boarded it and commenced to interview some of them. An officious conductor, perhaps fearing that the work of the claim department might be endangered by having their stories published, stopped the car and put Brown off into a cornfield.

Young Brown was sore. He walked to a farmhouse near by and used the long-distance phone to his paper. But he didn't ask for the city editor. He talked to somebody else. In three-quarters of an hour there was an extra on the street. Big letters clear across the front page, "Another Bad Wreck on the P. Q. S." And the P. Q. S. was trying to build up good-will at the time and to feature safe travel.

Young Brown's father chanced to own the paper and Brown was working as a "cub" reporter to learn the business. You never can tell about the young man who is the "cub" reporter in your office to-day. In six months he may be in a place where you want him to believe in your good faith.

Notes of Petroleum Investigations of the United States Bureau of Mines

D. B. Dow, of the Bartlesville Experiment Station of the Bureau of Mines, has begun an investigation of blended products containing natural gas gasoline. At present the natural gasoline manufacturers are having difficulty marketing their product, because of the overproduction of gasoline, and because of prejudice against natural gas gasoline blends. Mr. Dow is conducting a series of experiments with various types of blending material in connection with high and low stage compression gasoline By proper selection of blending material and use of the proper amounts of natural gas gasoline, it may be possible to produce a mixture with characteristics similar to those of "straight run" products. A study is being made by the Bureau of Mines of the relation between vapor pressures and rates of evaporation for straight-run and blended products.

The diamond-core drill, so common in mining, may become useful in testing out prospective oil fields, according to the Bureau of Mines. Recently the value of the diamond-core drill was proved by the successful completion of a well in Mexico. It has certain advantages over the other drilling systems and these have apparently been overlooked in oil drilling. The equipment is lighter and can be transported more easily, drilling should be cheaper with the improvement in equipment, and it furnishes a continuous core of the formation passed through. This is particularly valuable in testing a well because there is no danger of passing by a sand or stratum carrying oil. In rotary drilling the hole is full of mud fluid, and in much cable tool drilling the hole is almost full to the top with water, so that when encountering an oil bearing sand, the head of fluid exerts so great a pressure that the oil or gas does not come into the hole but the fluid in the hole actually goes into the sand. Thus, the driller may get no oil showing and decide the sand does not contain oil or gas and drill deeper. The disadvantage of the core drill is that it drills a small-sized hole, which may prove unsuitable for production purposes, but it deserves careful consideration for test work.

Sanitation is a most important factor in the successful development of a new oil field, declared A. W. Ambrose, chief petroleum technologist of the Bureau of Mines, before a recent gathering of Pan-American diplomats. Everyone is familiar with the fact that the construction of the Panama Canal was greatly delayed until problems of sanitation were conquered, said Mr. Ambrose. The health and contentment of the workers is a necessary adjunct to such a plan and companies should be urged to provide healthful and comfortable quarters for their men. If the camp is to be a permanent one, companies should also install adequate sewer systems. Where the camp must be built in a marshy locality, care should be taken to drain the camp site and surrounding territory to prevent the spread of malarial diseases. The value of amusement halls and the promotion of social life in isolated communities cannot be overestimated.

Another investigation to be conducted by the Bureau of Mines at Bartlesville Okla., relates to methods of treating petroleum products. Most of the progressive refiners in the country realize that the methods of treating petroleum distillates have for the most part been handed down from one generation to another and that in many cases they are not satisfactory. They are of the opinion that work should be done to determine proper methods for treating distillates from the various types of crude, for at present a method for treating products from one type of crude may not be satisfactory for treating products of a certain other type Also, the losses in treating are comparatively high, particularly in the case of the small refiners who make use of open-top agitators and as a result lose large amounts of the lighter fractions through evaporation. The problem of treating petroleum distillates has been assigned to D. B. Dow, who has had some previous experience along this line, having developed a method for treating casinghead gasoline that is now being used by several plants in the mid-continent field

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One of the most important problems in the oil industry is the production of certain grades of lubricating oils, such as cylinder stocks, from mid-continent crudes. Until recently these special products have been manufactured almost exclusively from Pennsylvania crude, but due to the increase in demand for products of this nature and to decreased production of crude from the Appalachian district it has been necessary to seek other sources for the production of cylinder stocks. Cylinder stocks are now made from mid-continent crude but in order to make satisfactory products it is necessary to subject the crude to special treatment for the removal of asphalt and other undesirable constituents. It is planned to make use of the experimental refinery at the Bartlesville station of the Bureau of Mines as a means of determining the best methods for handling the different types of mid-continent crudes for the production of cylinder stocks, also to determine the most satisfactory operating conditions for manufacturing products that can compete with lubricating oils made from Pennsylvania crude.

One in Eight Has Direct Interest in Utility Business

Interesting Figures from Indiana

One of the most graphic summaries of the ramifications of the utility business into the everyday life of communities that have thus far come to light has just been made public throughout Indiana by the Indiana Committee on Public Utility Information. A careful survey of the utility business in the Hoosier State has just been completed and it shows the startling fact that one Hoosier in every eight is directly interested in the utility business. This does not include, of course, the percentage of persons who are consumers of the products of utilities. In such a State as Indiana, where interurban roads form a network throughout the entire State, where hundreds of cities, towns and hamlets are supplied with gas, water, light and heat, and where scarcely a farmer ploughs a furrow that does not somewhere pass under his own telephone line—in such a State the ratio would be very nearly 100 per cent of the population indirectly interested in utilities.

But the Hoosier survey shows that thousands of Indianians are either employees of, stockholders in or bondholders in utility companies. The Indiana committee made its unusual statement through Harry Reid, chairman of the committee on information and president of the Interstate Public Service Company, which represents the Insull groups in Indiana.

"We have been taking stock of present conditions," said Mr. Reid, "to find out the extent of the utility industry in Indiana. We asked utility companies to advise us how many employees they have and at the same time to let us know how many stockholders and how many owners of bonds they have. The figures we have received lead us to believe that one person out of every eight in Indiana has a direct interest in the operation of the light, water, gas, telephone and traction industries. We sent out letters to 375 companies in the State. This number covers practically all the utilities with the exception of natural gas companies, municipal plants and co-operative telephone exchanges. Of the 375 companies asked as to the number of their employees, 141 replied showing a total of 19,710 employees. Averaging the wage-earner's family at four, this would mean that 78,640 people are dependent on the utilities for their daily bread. Of the 375 companies, 126 gave us information concerning their stock and securities holders, showing a total of 41,176 people with direct financial interest in the utility business. Averaging the family at four again, this would mean that 164,704 people in the State are directly concerned with the ability of the utilities to operate at a reasonable profit. Adding the two totals, our survey shows 243,544 people.

Figured Based on Actual Information

"This figure is based on actual information received from the companies. Answers came from, roughly, one-third of the companies, not counting the natural gas, municipal plants or co-operative telephone companies. All the larger companies addressed among the 375 supplied information. We therefore believe that our total represents two-thirds of the utility business, still excluding the natural gas, municipal plants and co-operative telephone companies. If two-thirds is a fair estimate, then there must be a total of 361,801 persons interested directly in the public utility business of Indiana. This would mean one in eight.

"It is impossible to make an estimate of the number of people working for or interested in the natural gas business, the municipal plants and the co-operative telephone companies, but we believe that if these figures were known it would be seen that one person in five in this State has an interest in the public utility business. Such an estimate is, however, mere guesswork.

"There are more telephone companies than there are companies operating in any other branch of the utility business, and it appears from the survey that the telephone business has the largest number of employees. Replies from sixty-one telephone companies show a total of 6,625 persons. The smallest number of companies is found in the electric railway field, but it is believed that this industry has the greatest number of stockholders and securities owners. Eighteen of these companies reported a total of 16,966 partners owning stock and bonds, whereas the sixty-one telephone companies reported 8,664, less than half the number shown in the traction field.

Tax Figures Reveal Magnitude of Industry

"Another indication of the magnitude of the public utility industry in the State is found in the report from the State Board of Tax Commissioners for 1921, which indicates that the utility industry was valued by the board for State tax purposes at more than $200,000,000. The electric railweys were figured at $64,825,423, and the telephone companies at $42,432,398. All other utilities companies were grouped together under the heading "utilities" and rated at $95,539,064. These totals do not, of course, cover the entire value of the utility property, as they do not include assessment valuation set by county officials for the purpose of raising city and county taxes.

"The utility companies operating in Indianapolis employ a total of 5,751 people, and they have a total of 15,115 persons owning stock and bonds. This means 20,864 people directly concerned with the prosperity of the public utility industry in Indianapolis. Averaging the family at four, there is a total of 83,456. This means that more than one out of every four people is in some way connected directly and definitely with the well-being of the utility industry.

"It is believed that there is no home in Indianapolis that is not a patron of at least one of the utility companies.

"Another indication of the vital importance of the utility business to the community is to be seen in the share of the tax burden the industry carries. In 1921 the utility companies in this city paid to the county auditor a total of $1,474,445 in taxes for the year 1920. This is a payment averaging $4,039 a day. During 1921 the county auditor collected approximately $15,000,000 in taxes, which would indicate that one dollar out of every ten came from the public utility companies supply the county with gas, telephone, water, traction and light services."

Committee to Revise Oil Specifications

At the first meeting of the recently formed Interdepartmental Petroleum Specifications Committee, held in the offices of the Bureau of Mines in Washington, D. C., Feb. 27, consideration was given to certain changes in specifications for lubricating oils of various grades which were advocated by refiners on the Pacific Coast. Some of the changes suggested were agreed to by the committee. The changes have been submitted to the Federal Specifications Board, and it is hoped to incorporate them in the technical paper containing revised specifications for petroleum products, to be published shortly by the Bureau of Mines.

The committee postponed the discussion of proposed changes in specifications for transformer oil, aviation gasoline, kerosenes, and signal oil. It was decided to appoint a subcommittee on greases.

The personnel of the new committee is the same as that of the former Technical Committee of Standardization of Petroleum Specifications. The new committee, however, reports directly to the Federal Specifications Board. The revision of Bulletin 5 of the old committee, which was made last fall, has had the approval of the Federal Specifications Board, and will shortly be published in the form of two technical papers of the Bureau of Mines. Of these, Technical Paper 298 will relate to methods of testing petroleum products, and Technical Paper 305 to specifications.

N. A. C. Smith, petroleum chemist of the Bureau of Mines, presided at the meeting. There were present representatives of the Panama Canal, the Shipping Board, the War Department, the Bureau of Public Roads, the Bureau of Standards, the Post-office Department, the Navy Department, the American Petroleum Institute, the American Society for Testing Materials, the American Society of Mechanical Engineers, and a number of California oil-refining companies.

Permissible Carbon Monoxide Indicators

Schedule 18 just issued by the United States Bureau of Mines gives the procedure for establishing a list of permissible carbon-monoxide indicators that are light in weight and portable for quickly and easily showing presence of carbon-monoxide gas in mine rescue and recovery operations; or around blast furnaces, producer-gas and water-gas plants, and metallurgical and chemical plants. Examinations and tests of carbon-monoxide indicators submitted by manufacturers will be made at the Experiment Station of the Bureau of Mines at Pittsburgh, Pa. The permissible indicators are to be reliable for indicating dangerous amounts of carbon monoxide in air breathed and are to show quantitatively the approximate concentration of the carbon monoxide. However, the quantitative indications may in general be less dependable than laboratory analyses. Before being placed upon the permissible list, indicators must comply with the Bureau of Mines requirements in regard to materials, design and construction, weight and size, tightness, time for indications and gas volumes. Chemical tests that must be met relate to minimum carbon-monoxide indication, accuracy of quantitative indications, and to the capacity of absorbent for interfering gases. Tests in artificial light, at low temperature and with flue gases are also made. Lists of permissible carbon-monoxide indicators will be made public from time to time. Copies of Schedule 18 may be obtained from the Bureau of Mines, Washington, D. C.

Effect of Back Pressure on Oil Production

Work is being continued by the Bureau of Mines at the Bartlesville station on the effect of back pressure on oil production. The production of well No. 7 of the Osage Development Company in Oklahoma has been measured daily under various back pressures. Samples of the fluid produced were taken hourly for several days and the water and basic sediment content determined. A back pressure of about twenty-five pounds affected the oil produceion when the tests were first started but several months later a back pressure of only twenty pounds affected the same well. Final conclusions as the effect of back pressures on wells on this property have not been drawn. There is comparatively little information available as to the effect of back pressure or vacuum on producing wells and this investigation should be of great interest to oil producers. If back pressure can be held on producing wells without materially affecting production, large quantities of gas can be saved, as the gas is now frequently blown into the air in order to keep from putting a back pressure on the well.

New Publications

New publications obtainable from the Bureau of Mines, Washington, D. C., are as follows:

Serial 2312, Low-temperature distillation of amalgam of bituminous non-coking coal and asphaltic oils.

Serial 2313, Solubility of oil shales in solvents for petroleum.

Serial 2317, Recent articles on petroleum and allied substances.

Serial 2322, Properties of typical crude oils from the producing fields of Kansas.

Vapor Tension of Natural Gas Gasoline

D. B. Dow, of the Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla., has completed the field work for a report on vapor tension of natural gas gasoline. This includes tank-car tests under winter conditions. Gasoline of a vapor tension of approximately fifteen pounds was used in both standard and insulated cars. At 68 deg. Fahr. a pressure of five pounds was developed in the standard car and 0.5 in in the insulated. At 20 deg. Fahr., the lowest temperature tested, no pressure developed in either car. Weathering tests indicate that gasoline lost in weathering from ten to eight pounds.

As the Journal Views It

The Coal Situation

From reports published in the daily newspapers of the country, it would seem that the Federal Government is absolutely at sea regarding the coal situation in the United States. Dispatches, which are accredited to "official sources," are contradictory in every paragraph and seem to be filled with baseless rumor. Either the Government does not know what the situation is, or the game of politics is being played for all it is worth.

In investigating the situation so far as it affects public utilities, the AMERICAN GAS JOURNAL has learned from men who know whereof they speak that the threatened coal strike of April 1 next will be a "mere formality," and that there is actually nothing to worry over. If the men go out the "strike" will not affect the coal supply in any way so far as public utilities are concerned. This statement was made positively by one authority, whose name is held in confidence in the JOURNAL office, and he added that much of the so-called information that is being made public is propaganda that will be shown by events to be without foundation.

According to the JOURNAL's informant, there is a sufficient supply of coal above ground to care for the needs of the utilities for many weeks to come. He added the significant statement that in the "strike"—if it is to be dignified by that name—less than half the mines will be thrown out of their usual routine of operation.

If the informant of the AMERICAN GAS JOURNAL is correct, and he certainly is in a position to know whereof he speaks, then it would seem that the Federal Government is not doing the investigating that it claims or else that it is not checking up on statements that are being made to it. We are inclined to believe that both of these conditions exist, for the absolute lack of energy displayed by the Department of Commerce under Herbert Hoover, is one of the most startling developments of the entire situation.

This much we can assure the readers of the AMERICAN GAS JOURNAL: There will be no coal shortage so far as public utilities are concerned provided the United States Government does its duty in protecting the public. If there is any failure it will clearly be due to negligence on the part of officials and utilities will not be held responsible.

Of course, gas companies will continue to take every precaution that safe operation dictates, and this includes as large a coal reserve as the finances of a company will allow. But it is not always possible for a company to make a large investment in coal to be used at a distant date, while other bills are pressing for immediate payment.

But from our investigation we believe that we are justified in taking the stand that there is nothing in the situation to cause alarm.

Confidence Displayed

The confidence that the public utility men of Illinois feel in the future was clearly indicated at the joint convention, held in Chicago last week, when it became known that many extensions and improvements to properties are planned for the coming months. It is this sort of spirit that is going to win out and is going to produce better business in every direction. If this feeling could be inculcated in the industry as a whole, then other lines of business would be sure to follow in our footsteps and we would hasten the time when the country will come out of its slump. There is no real reason why the depression should continue, for every day on all sides, we learn of some new development that shows which way the wind is blowing.

We are in accord with the progressive spirit that was displayed at the convention by the Illinois utility men and we hope that the coming conventions of other States, many of which are scheduled for the near future, will also emphasize plans for enlarging their activities so that there will be no doubt as to the front that is presented by the industry as a whole. We know there is no reason for the gas industry to continue longer in the period of depression which we have felt in the past and statements made at the Illinois convention are proof positive of this assertion.

Bituminous Coal as Generator Fuel

(*Continued from page* 252.)

with the result that the generator lids soon became red hot and the upper hot valves were overheated. It was necessary to resume the former steam supply in a very short time. The other items of heat loss are for the most part self-explanatory and cannot be reduced readily with present practice. The blown-over fuel is one of the heaviest items and is objectionable in every way but, as previously stated, there seems to be no ready means of reducing it greatly. The writer believes that a more uniform sizing of the fuel, avoiding the very fine coal, might help some, but since the coal disintegrates in the fire quickly, instead of forming a coherent coke, even careful sizing would not obviate the difficulty. One of the sets has been equipped with a sheet-iron ring twelve inches wide, fitting the set wall snugly just below the grate. The idea of the device was to force the blast and steam up the center of the fuel so as to diminish the tendency to form holes around the circumference. No very marked improvement, however, resulted from this device.

TABLE IV*a*

Heat Balance of Installation

A. Heat input per 1,000 cu. ft. of finished gas, above 60 deg. Fahr.

	B.t.u.	%
1A. Generator fuel, heat of combustion, 46 lb. x 12,465 (B.t.u. per lb.)	573,400	50.00
2A. Sensible heat of air blast, 4,520 cu. ft. 346.5 lb. x 0.237 (sp. ht.) x 5	411	
3A. Steam to generators, 50.5 lb. (7.3 lb. press. 34 deg. Fahr. supht.) 50.5 x (1,158 — 201 + 0.475 (sp. ht. x 34)	49,144	4.3
4A. Oil to sets, heat of combustion 3.72 gal., 26.7 lb. x 19,400	517,980	45.20
5A. Heat carried by water vapor in air blast, humidity 50 %. Temperature 65 deg. Fahr.	negligible	
6A. Sensible heat of coal	negligible	
7A. Sensible heat of oil, 3.72 gal., 26.7 lb. x 0.4 (sp. ht.) x 33	352	
8A. Feed water to boilers, 92.7 lb. x (122 — 60)	5,744	0.5
	1,147,031	100.00

TABLE IV*b*

Heat output per 1,000 cu. ft. of finished gas.

	B.t.u.	Input %
1B. Heating value of finished gas.	561,000	49.0
2B. Heat in undecomposed steam, 38.6 lb. at 726 deg. Fahr. 38.6 [(212-60) + 970.4 + (0.462 x 514)]	52,290	4.6
*3B. Sensible heat in illuminating gas 23.58 (sp. ht.) x 666 (deg. rise)	15,704	1.4
*4B. Sensible heat in stack gas 4 m. x 20.44 (sp. ht.) x 896 (temp. rise)	73,256	6.4
5B. Heat of combustion of stack gas 4,000 cu. ft. at 318 B.t.u. per cubic foot	127,200	11.1
6B. Water vapor in stack gas, from fuel 3.26 lb. from air 2.14 lb. 5.40 lb x [0.51 (sp. ht.) x (956 — 212) + 970.4 + (212 — 60)]	8,105	0.7
7B. Blown-over coke removed 4.8 lb. x 11,497 B.t.u.	55,100	4.8
8B. Ash, clinker and unburned fuel 4.25 lb. x 3,172 B.t.u.	13,480	1.2
9B. Sensible heat in rejected coke and ash 9.05 lb. x 0.2 (sp. ht.) x 1,040 (temp. rise)	1,882	0.2
*10B. Steam generated in waste-heat boilers 91.3 lb. x 1,134.7 (B.t.u.) + 1.39 lb. (blown-down) x 227 (deg. above feed temperature)	104,000	9.1
11B. Heating value of tar 3.76 lb. x 1,805 B.t.u.	67,868	5.9
12B. Sensible and latent heat of tar 3.76 lb. (150 + 0.65 x 664)	2,184	0.2
13B. Radiation and convection	11,770	1.0
Heat accounted for	1,093,839	95.6

*Subsequent to the test it was discovered that the tube cleaner used with waste-heat boilers was too small, with the result that a layer of carbon about one-quarter inch thick was left on the interior of the tubes. With a proper size turbine cleaner, this layer was removed and the stack temperatures were materially reduced. Several of the above items are affected by this change, but those marked by the asterisk are the only ones materially affected. An increase of heat recovered in the boilers to about 12 per cent is indicated. This is discussed in the text.

Summary of Conclusions

1. Operation under the described conditions results in the recovery of approximately 60 per cent of the heat input in the finished gas, tar, and solid residues from the sets.

2. The waste-heat boilers recovered slightly over 9 per cent additional heat during the test. At times they supply as much as 200 boiler horse-power in excess of the amount used in the water gas generator house. Since the employment of a more efficient tube cleaner has begun, the stack temperatures have been greatly reduced. A present recovery of about 12 per cent of the heat input, in the steam generated, is now indicated.

3. The sets, boilers and connections do not appear to have sufficient combustion space to insure thorough mixing and complete combustion of the blast gas by the tertiary air. More complete combustion could be secured if the intervals during which no secondary or tertiary air is admitted, could be shortened.

4. Since the tubes have been more efficiently cleaned, something over 50 per cent of the recoverable heat is recovered. Whether with complete combustion the stack temperatures could be kept down within reasonable limits seems doubtful. A two-pass boiler might be justified if the additional steam were needed.

5. Fuel blown over from the generators to the checker chambers is a nuisance and source of loss. It amounts

to nearly 5 per cent of the heat input to the installation. The recovered fuel can be used as boiler fuel but not very efficiently. If this difficulty could be eliminated, there would be not only a marked saving in fuel but also in time and labor costs. The gas production per day could be increased very materially.

6. The oil consumption of the sets under test conditions was excessive, indicating low oil efficiency, poor quality of blue gas or both. The latter condition appears from the gas analyses, to be chiefly responsible. Whereas the blue gas produced from steaming was rich, about 336 B.t.u. per cubic foot, it was mixed with sufficient blow run and air purge gas to bring the average quality down to about 213 B.t.u. This low quality mixture together with the six-inch spacing of the checkerwork to prevent clogging with blown-over fuel, seem responsible for the high oil per thousand cubic feet. Previous work in which the writer has participated showed that even with a thirty-second blow-run, a 565-B.t.u. gas could be made with 3.1 gal. of oil per thousand, provided there were no serious blow holes through the fire. The air purge is much leaner and reduces the blue gas quality excessively, especially when as in the present case there are usually holes in the fire, and the blast pressure is high. The writer believes that approximately 0.6 gal. of oil per thousand cubic feet of gas in excess of the expected requirement is accounted for by excessive length of air purge and the wider spacing. *J. A. Perry has shown that with spacing out to 6.5 inches the fixing effect of the bricks is up to 87 per cent of that obtained with 3.09 in., the most favorable spacing. This alone would seem to account for perhaps 0.3 gal. of oil per thousand cubic feet of gas. The larger make of gas with the blow-run and purge, a certain coal saving represented by them and the advantage of wide spacing from the mechanical standpoint may together justify this operating procedure. The advantages must, of course, be weighed against the cost of oil.

In conclusion, it may be stated that the purpose of this paper is neither to deprecate nor defend the use of coal as generator fuel. That is not necessary. The balance sheet is the best indication of the economic value of a process and it is what primarily must influence the operator, providing plant and other conditions make the use of either one fuel or another feasible.

The heat balance can only point out the nature and magnitude of the heat losses and show the possibilities for greater economy.

Acknowledgments

In the conduct of this test, thanks are due the officers and employees of the Coal Products Manufacturing Company for the co-operation rendered at all times. Messrs. W. M. Willet, W. J Murdock and E. E. Lundgren gave many valuable suggestions and cleared away many obstacles which would have greatly hindered successful testing. Messrs. Bigelow, Ford, Cretney, McOwen, Lowry, Miller and Baus did good work as observers and analysts. R. D. Leitch, of the Bureau of Mines rendered efficient service in analytical work and in compiling data.

*American Gas Association Monthly, Vol. III. No. 8, p. 428.

News of the Texas Oil Fields

The following items must be construed as news from various sources and not as propaganda of any sort:

Bremond, Texas, reports many wells going down and they are sanguine of wildcat success.

The name of Colonel A. E. Humphreys works magic in Texas oil circles. He is intently watched, and many try to duplicate his movements.

At Breckenridge, Texas, the Black Brothers Ranch of 11,000 acres has been let for oil royalty, for the sum of $250,000.

At Corpus Christi, Texas, 100 wells have been started since Jan. 1.

At Mexia, Texas, the Western Oil Fields Corporation, of Denver, was paid $249,953 for its pipe line run during January.

The Humble Oil Company's production for 1921 was 16,000,000 bbl. In 1920 it was 10,000,000.

Mexia field is said to have produced 11,000,000 bbl. of oil in fifteen months of life.

The city of Mount Pleasant, Texas, is said to be booming because of oil activities there and thereabouts.

Humphreys Pure Oil Company is building a 205-mile pipe line from Mexia to Teague.

Mexia reports that Sinclair is after some Mexia leases.

Pecos, Texas, reports that a forty-foot gas flame lights the oil field.

Oil is coming in Texas faster than steel tanks can be made, and it was necessary to obtain permission from the Texas Railroad Commission to store the overflow in open earthed tanks.

The Haskell Dividend pays $7.77 on $100 invested.

The Magnolia Oil Company has struck oil in Kauffman County.

Humphreys buys 5,000 acres in Navarro County, Texas.

Somebody has figured that so far there has been only 37,000 square miles of Texas tapped for oil and that there are many vast pools still awaiting. The area of Texas is 265,780 square miles, hence it is there is lots of room for many more drills, theoretically.

A Washington statement informs us that on the first day of this year there were operating in the United States 303 petroleum refineries with a total daily indicated capacity of 1,735,725 bbl. as compared with 328 operating plants having an indicated capacity of 1,714,385 bbl. on Jan. 1, 1921.

There are many inoperative refineries in the country.

Gasoline showed a total production in 1921 of 5,153,549,318 gal., or a daily average of 14,119,313, compared with a total production of 3,957,857,097 gal. in 1919, at the daily rate of 10,843,444.

Domestic consumption of gasoline for 1921 exceeded 1920 by 260,000,000 gal. and 1919 by 1,081,000,000. Exports and shipments for 1921 amounted to a daily average of 1,511,000 gal., 283,000 gal. less than the daily figures for 1920, but 463,000 gal. in excess of the daily average for 1919.

Production of kerosene for 1921 indicated an average daily production of 5,329,113 gal. as compared with 6,339,059 for 1920 and 6,415,430 gal. for 1919, while gas and fuel oil production for 1921 showed an average daily increase of 2,164,000 gal. over 1920 and 5,579,000 more than the figure for the preceding year.

The daily average production of lubricating oils was decreased by 455,000 gal. during 1921, consumption also showing a daily decrease.

Developments in Gas Technology

Important Information Gathered from All Parts of the World

By ISMAR GINSBERG, B.Sc., Chem. Eng., Associate Editor

Utilization of Coke Breeze for Generation of Steam

The use of coke breeze for the production of steam is easily fifty years old, but it is only recently that this fuel received serious attention. Then it was found that it possessed many advantageous properties which tended to make it rather sought after than avoided. It stands up well in comparison with slack coal, which often contains 50 per cent dust and yields as much as 30 per cent ash. It is claimed that coke breeze can be burned without artificial draft and that a specially designed furnace is not essential. With natural draft the coke will burn rather slowly and a high steam production must not be expected with this fuel. The rate of combustion of the fuel should not exceed twenty-five pounds per square foot of grate area per hour. As quite a considerable quantity of moisture can be held by the coke breeze, care should be taken to avoid the combustible coming in contact with water and also in quenching the coke and breeze, that is coke dust, as it comes out of the furnace, it is well to limit the amount of water used carefully. For further details in connection with this subject, see the *Gas Engineer*, 2-15-22, page 44.

Problems in Gas Technology

E. V. Evans, of the South Metropolitan Gas Company, of London, discusses some solved and unsolved problems in the gas industry in an article, published in the *Chemical Age*, of London, 1922, page 168 to 169. Among others there is mentioned the deposition of naphthalene in the gas mains. Naphthalene is removed from the gas successfully by washing the same with ordinary anthracene oil, resulting from the distillation of coal tar, after the oil was first steam distilled. The gas and oil were passed in countercurrent through the standard type of washer scrubber. Another problem which is still unsolved is the removal of sulphureted hydrogen from gas. The disadvantages of the iron oxide process are many. The use of the Bayer process, wherein activated charcoal is employed to absorb gases, has not been successful, due to the fact that the charcoal not only removes the sulphureted hydrogen but a good proportion of the illuminants in the gas as well. The treatment of the gas with oxidants in the cold seems to hold out the most encouragement. The use of certain dyestuffs, which are easily reduced, for this purpose is also discussed. Some attention is given to the subject of low temperature carbonization, which is characterized as not being unsound practice.

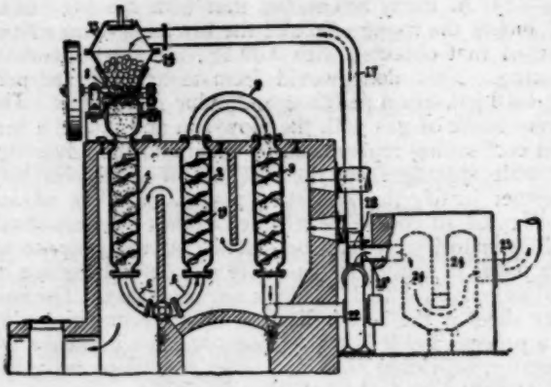
Extraction of Phenol from Tar by Sodium Sulphide Solution

One of the most important constituents of coal tar is the phenolic bodies in it and the possibility of extracting this by a cheap and technically simple process has a lot to do with the subsequent utilization of the tar. Some important work has been done along these lines with sodium sulphide solution, the results of which are published in *Brennstoff Chemie*, 1922, 1.

It was found that the phenolic bodies in coal tar were very soluble in the solution of sodium sulphide and could be precipitated therefrom very readily by introducing hydrogen sulphide. It was also found that sodium hydrosulphide dissolves phenols on heating with the evolution of hydrogen sulphide, so that both processes can be combined advantageously. The acid constituents of the coal tar are absorbed by the sodium sulphide solution.

Low-Temperature Tar

In German Patent No. 332,109, there is described a process and apparatus for obtaining low temperature tar by heating of the raw material, either coal, lignite, peat and the like, which is led through the distillation tubes, heated externally and removal by suction of the matter formed in the heating process. The same suction or pressure effect serves to move the raw material, which is to be distilled, through helical shaped surfaces, arranged in the tubes, from one tube into the next connected with it. The gas which is evolved is led into a chamber, mixed with



solid matter, wherein the solid particles are allowed to settle. The coal continues through the series of distillation tubes until it has been completely degassed. It may be mixed with tar oils or else hydrogen may be added to it.

The accompanying cut shows the arrangement of the apparatus. The coal is dumped into the open hopper 15 and falls into the funnel 14; thence it passes through grinders 9 and 10 and finally falls by gravity into the first retort 1. The fan 22 removes the coal from the retort 1 through pipe 6 into the retort 2 and from the latter through the pipe 7 into the retort 3, wherein the degasification is completed. The fan removes undecomposed coal, gas, tar, water vapor and ashes all together and sends the coal that is not entirely degasified back to the hopper 15 through the return pipe 27. The valve 28 controls the return of the coal for repeated degasification. From time to time this valve is adjusted so that the products go to the ash chamber 24, in which the ashes are removed, while

the other constituents escape through the pipe 25 and go to the cooling arrangements, wherein the gas is freed from aqueous and oily constituents.

Lubricants from Lignite-Tar Oil

It is now known that the Germans have had considerable success in obtaining lubricating oil which has all the properties of a good grade of mineral product from coal tar. In *Brennstoff Chemie*, 1922, 10, there is published an account of certain laboratory experiments made with the idea of producing a lubricant from lignite tar oil. The main difficulty to overcome is the high content of the latter in phenol. When caustic soda is used to eliminate the phenol from the oil the viscosity is reduced so much that the final product has but little value as a lubricant. Further experiments have been made, heating the oil with beta-naphthalene sulphonic acid. The results were partly satisfactory and further work is being done along these lines.

Gas Saver for Sadiron

The use of a hot plate with just one opening in it is fairly familiar to the user of the gas stove as considerably effective in saving gas. The same idea has been adapted to sadirons. This device is made with an angle ring frame and corrugated center plate, in which there are cast two holes in the shape of the

sadiron. The principle on which the device works is very simple. While one opening is placed over the gas burner and the iron is being heated, the temperature of the other iron in the other compartment is being increased, so that when the hot iron is removed, the other is merely pushed over and is ready quickly. The arrangement can be used for three irons as well.

Illuminating Gas and By-products from Coal

The process of manufacturing gas and by-products from coal, as described in British Patent No. 174,165, consists in distilling coal or other carbonaceous materials at low temperatures with the aid of a gas, which is rich in hydrogen and which is mixed with superheated steam at 500 to 600 deg. Cent. The hydrocarbonous vapors, recovered by condensation, may be fractionated and the light oils further treated to produce motor fuel. The heavier oils are used to produce the distilling gas, rich in hydrogen, mentioned above. This is done by passing the oils, mixed with highly superheated steam, through small iron pipes, which are heated to a temperature of 800 to 1,000 deg. Cent. In this way, a fixed gas is obtained which contains from 60 to 75 per cent of hydrogen. The residue obtained in this process is a hard coke, containing 5 to 8 per cent of hydrocarbons. If it is desired to produce a metallurgical coke, the temperature is raised to 700 to 900 deg. Cent during the last stages of the distillation.

The apparatus consists of a vertical retort, into which the coal is fed through a hopper, located at the top. The coal in the retort rests on a perforated grid, near the bottom. The gases are drawn off through an outlet near the top of the retort and the coke is removed through an outlet located below the perforated grate. The grate is pulled out of the retort for this purpose. Oil is fed into a vaporizing chamber, which is connected with a water tube boiler, from which steam is obtained and mixed with the oil vapors. This mixture is allowed to enter the retort at a point below the removable grate. and additional steam is added through a nozzle, located in the inlet pipe, connecting the retort with the oil vaporizing chamber. Hot gases from the furnace are passed around the retort, which is surrounded with a brick jacket. A ram is provided for assisting in the removal of the coke.

Gas Cleansers

British Patent No. 173,668 refers to a cooling and cleansing arrangement, designed to be used in connection with gas producers. This consists of several superimposed chambers which possess sloping floors, so that one end of the chamber is smaller than the other. These chambers are so arranged that the smaller end of one chamber is directly under the larger end of the one above it. The gas is admitted at the restricted end of the chamber and expands as it passes through the enlarging chamber until it reaches the wide end, where it leaves through a short pipe, which connects the wide end to the restricted end of the chamber above it. The gas proceeds through the various chambers in this way and leaves through an outlet located in the uppermost unit. This unit is filled with asbestos or other noninflammable material which acts as a filtering medium. Each unit is also provided with drain pipes for the removal of condensed vapors. The various parts are made interchangeable and the apparatus can be adapted for use with gas producers of all capacities.

The Value of Natural Gas in the Osage Nation

Information is being collected by Bureau of Mines engineers for a report to the Secretary of the Interior on the value of natural gas in the Osage Nation in Oklahoma. This report is to be used in redetermining the price basis for the computation of royyalty on gas produced in the Osage Nation. Eleven gas leases have been made by the Department of the Interior covering the Indian lands of the Osage Nation. The present basis for determination of royalty is 18 cents per 1,000 cu. ft. at the well. Each lease has a clause providing for retdetermination of price basis at specified times. On March 16, 1918, the price of gas was established at 18 cents per thousand cubic feet for four of these leases and the price will hold until March 16, 1923. The present price of 18 cents for gas for the other seven leases has not yet been redetermined. The new price will hold from September 16, 1921, to September 16, 1923.

Gum-Forming Constituents in Gasoline

A new investigation being undertaken by the Bureau of Mines at its Pittsburgh, Pa., experiment station has as its object the determination of the cause of gum formation in gasoline in storage. M. B. Cooke, assistant refinery engineer, has been assigned to the investigation, which may require two years' time.

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	Mar. 16, 1922 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	104½	106
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	91	92
Columbia Gas & Elec. Co.	First 5s	May 1, 1945	90¾	91½
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	106	107
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	86½	87½
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	109½	110
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	74	78
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	85½	87
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	98	100
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	95	98
Hudson County Gas Co.	First 5s	Nov. 1, 1949	87	89
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1943	86	87
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	99½	100½
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	85	88
Milwaukee Gas Light Co.	First 4s	May 1, 1927	88½	90
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	88	89
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	104	106
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	94½	96
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	86	87
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	92½	93½
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	87	89
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	80	82
Southern California Gas Co.	First 6s	Nov. 1, 1950	94	98
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	87	90
Washington Gas Light Co.	General 5s	Nov. 1, 1960	90½	91½
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	87	89

San Joaquin Light & Power Reports Prosperous Year

Los Angeles, Cal.—The annual report of the San Joaquin Light & Power Corporation, recently completed, reveals a healthy condition and a year of well sustained and prosperous activity. Gross earnings were $5,595,112.07, an increase over the preceding year of $1,264,206.36, or 28.89 per cent, while operating expenses and taxes increased but $406,591.96. Taxes alone accounted for $269,993.93 of the increase. In 1920 5.9 per cent of every dollar of gross earnings was paid out in taxes, whereas in 1921 the amounts so paid out amounted to 9.14 per cent of gross earnings. Gross earnings would have been from $75,000 to $100,000 greater but for the strike in the oil fields, which decreased the revenue from oil fields operations very materially in September, October, and a part of November.

Production expenses decreased a total of $236,089.93, due to having a large amount of water power available throughout the year, and to the fact that power purchased by the company during 1921 cost only $8,265, where as in 1920 it was necessary to purchase power costing $227,290.

Total expenditures for maintenance were $332,319.31, an increase of $99,072.72. Maintenance expenditures were approximately 6 per cent of grass, as against 5.3 per cent gross in 1920.

The operating ratio decreased from 47.06 per cent in 1920 to 44.81 per cent in 1921. This was made possible by the larger amount of power available from the company's own generating plants.

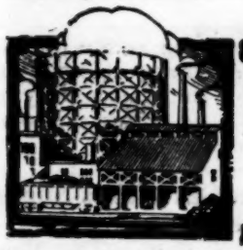
Anticipating future requirements. the company has installed generating capacity considerably in excess of its immediate needs. Full interest on this equipment is being charged against operating earnings, although full earnings are not being derived from the investment. Interest and bond discount charges increased $778,716.31 during the year.

During the year the company sold $9,000,000 par value of its unifying and refunding mortgage bonds; $777,300 par value of prior preferred stock was sold in order to provide in part the necessary junior financing. At the end of the year there was more than $1,500,000 of construction expenditures which had not been financed through the sale of either bonds or stock.

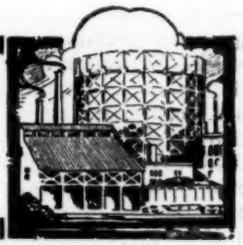
A contract had been made, however, for the sale of $3,000,000 par value of the prior preferred stock to a syndicate of investment bankers, thus placing the company in a position to pay off all of its floating debt; to take care of the $400,000 March 1 maturity of unifying bonds, and to leave approximately $360,000 available to pay for new construction.

Reference to the balance sheet shows expenditures for plant additions to have been $7,734,549.25; a reduction of $1,543,964.87 in current liabilities and an increase in surplus and reserves of $969,887.59. The company, according to the report, enters the new year in the best financial condition in its history.

Discussing the prospects for the coming year, the president, William G. Kerchoff, says that, due to depressed conditions for agricultural products, some plans for opening new land were temporarily held in abeyance. A better feeling now pervades the entire territory, and it is the belief that there will be much new development in the near future.



NEWS OF THE GAS INDUSTRY



Large Attendance at Joint Convention of Illinois Utilities Optimistic for the Future

1922 Construction Program of $75,000,000 Is Planned

Chicago, Ill.—Confidence in what the future holds for public utilities was reflected in the attitude of the large attendance at the second joint convention of the Illinois Gas Association, the Illinois State Electric Association and the Illinois Electric Railways Association, which was held here March 15 and 16. It was generally predicted that business conditions shortly would be normal and an era of progress was looked for.

Each section of the convention found an interesting program arranged for the two days' sessions and over 1,000 members and guests attended the banquet which was held on Wednesday evening.

The necessity of educating the public to the many advantages of gas was emphasized by different speakers and a plea was made for co-operation by the three associations with the Illinois Committee on Public Utility Information.

An interesting feature of the meeting was the statement that customer ownership of securities was rapidly growing and that through this source greater interest by the general public was being displayed in the problems of the utilities.

A statement that showed the general feeling business conditions are improving was that the utilities of Illinois plan to spend $75,000,000 during the year on extensions and improvements.

A large part of the contemplated expenditure will be devoted to the new gas plant at Oak Park, it was said.

Practically every branch of activity of the gas business was discussed at the sessions of the gas association which were held each afternoon following the joint general sessions that took up the mornings.

The program of the gas section follows:

WEDNESDAY AFTERNOON, MARCH 15

Paper—"Advertise! But How?" Charles W. Person, secretary, Advertising Section, A. G. A.

Discussion—F. M. Lester, Public Service Company of Northern Illinois; J. P. Roche, McJunkin Advertising Company; Fenton Kelsey, Fenton Kelsey Company.

Paper—"Gas a Big Unsold Market in Connection with Automatic Water Heating," A. P. Post, chairman, Commercial Section, A. G. A.

Discussion—F. F. Cauley, Peoples Gas Light & Coke Company; John G. Learned, Public Service Company of Northern Illinois.

Paper—"Bituminous Coal," W. A. Dunkley, gas engineer, U. S. Bureau of Mines.

Discussion—J. C. Hart, North Shore Gas Company; R. B. Harper, Peoples Gas Light & Coke Company; R. B. Richardson, Illinois Traction System.

THURSDAY AFTERNOON, MARCH 16

Paper—"Accounting," Ewald Hasse, chairman, Accounting Section, A. G. A.

Discussion—F. M. James, Western United Gas & Electric Company; W. J. Achelpohl, Illinois Traction System; S. J. Palmer, Public Service Company of Northern Illinois.

Paper—"The Manufacturer's View," T. D. Miller, Consolidation Coal Company.

Discussion—F. A. Lemke, Humphrey Company; George D. Roper, George D. Roper Corporation; E. V. Daily, James B. Clow & Sons.

Paper—"The Past, Present and Future of the Gas Industry," H. H. Clark, affiliation representative, A. G. A., president Illinois Gas Association.

Discussion—J. H. Eustace, Peoples Gas Light & Coke Company; W. M. Willett, Western United Gas & Electric Company; H. S. Whipple, Rockford Gas Light & Coke Company.

Brooklyn Union Gas Wins Rate Decision in Supreme Court

Washington, D. C.—The appeal brought by the Attorney-General of New York and the District Attorney of Kings County to have reviewed the decision of the United States District Court in the Brooklyn Union Gas Company case holding the statutory gas rates of New York confiscatory was dismissed on March 13 by the Supreme Court.

The action of the court in the Brooklyn Union case was based upon its decision on the Consolidated Gas Company cases, delivered on March 6, in which it held the rates fixed by the State were confiscatory.

The State and Brooklyn city officials sought to except the Brooklyn Union case from that decision by contending that the company should have used in 1918 and 1919, during the period of high operating costs, a portion of its "contingency" fund, which, it was asserted, had accumulated out of its liberal surplus earnings during prior prosperous years. Had this fund been resorted to, they insisted, there would have been sufficient funds available to bridge the company over the period when the State rates were confiscatory.

The company asserted that the surplus had been invested in extensions and improvements, and that it was not held as a fund.

Following the decision of the lower courts in declaring the 80-cent gas law confiscatory and pend-

ing the decision of the United States Supreme Court on appeal the Brooklyn Union Gas Company has been charging $1.25, to which point it was reduced voluntarily by the company from $1.40, which was established as the rate following an examination by a special examiner in the United States District Court.

Brief argument was heard by the court on the motion made by the Consolidated Gas Company to have the mandate of the court, giving effect to its decisions of March 6, issued immediately instead of postponed for the customary thirty days. Counsel for the Consolidated urged the importance of prompt action so that the impounded fund would be available, whereas counsel for the District Attorney of Kings County, speaking for that official in the Brooklyn Union cases, urged the court to withhold the mandate until after it decided whether it would reopen the cases already disposed of.

Chief Justice Taft said the court would take the motions under consideration.

Public Utility Lectures at Princeton University

Included in a series of lectures on engineering subjects of more than ordinary prominence being held under the auspices of the Cyrus Fogg Brackett lectureships at the University of Princeton, open to the public, are the following public utility lectures:

March 15—"Influence of the Executive Upon Engineering Practice of the Public Utility," by Charles Edgar, president of the Edison Illuminating Company of Brooklyn.

April 4—"Pacific Coast Public Utility Development," by John A. Britton, vice-president of the Pacific Gas & Electric Company.

April 8—"The Petroleum Industry," by Dr. N. E. Loomis, director Experimental Division of Development, Standard Oil Company of New York.

May 9—"Some of the Personal Problems of a Graduate Engineer," by Col. W. C. Spruance, vice-president of E. I. du Pont de Nemours Corporation.

THE BOSTON CONSOLIDATED GAS COMPANY reports gas output for February of 557,479,000 cu. ft., an increase of 3 per cent, compared with the corresponding month a year ago. The January output was 658,360,000 cu. ft.

Jersey Gas Cut from $1.40 to $1.25

Trenton, N. J.—Under an order issued March 5 by the State Board of Public Utility Commissioners, the Public Service Gas Company must reduce the price of gas from $1.40 per thousand cubic feet to $1.25, effective March 25. The new rate, like the one now in force, is to apply to all consumers.

The order was issued in connection with the application filed by Newark and Jersey City for a preferential rate of $1.10. Other municipalities opposed the move for a sectional rate on the ground that the company probably would have to raise prices in other communities to make up for any reduction order in a particular zone. Referring to the contention of Newark and Jersey City that the counties of Hudson, Bergen and Essex should be segregated from the rest of the system and given a rate in accordance with their demand, the board stated that at this time there are not before it appraisals of the property in any of the divisions other than the Passaic division, and in view of the practice heretofore adopted, the rate should be continued as company-wide rate until it is possible to obtain an appraisal of all the property of the company.

The board stated that if the valuation of the property in the counties of Essex, Bergen and Hudson should be disregarded, and a rate should be fixed on a basis of the operating costs only, a slightly lower rate might be possible in these counties.

Southern Counties Gas Starts Erection of Gas Tank at Venice

Venice, Cal.—A 2,000,000 cu. ft. gas holder, costing about $200,000, is to be built at once by the Southern Counties Gas Company at its plant at the corner of Rose Avenue and Washington Boulevard, Venice, according to an announcement by the company.

The new holder is to improve the service and render a greater supply of gas to the Santa Monica Bay consumer. Work on this improvement started last week, when a crew of men started excavating on the holder site.

The foundation for the holder, which alone will cost $18,000, will be completed in April, and at that time construction work on the steel holder will begin.

Contract calls for completion of this equipment early this fall in order to enable the gas company to meet its peak load during the coming winter season.

New Haven Gas Makes Slight Rate Reduction

New Haven, Conn.—The New Haven Gas Light Company put into effect from March 1 a slight reduction in the cost of gas to its customers. This action followed the recent annual meeting of the stockholders of the company, at which the statement was given out that the amount of gas sold during the year was 2.31 per cent less than in the preceding year. The company reports a substantial reduction during the year in the prices it had to pay for coal and oil, two of the most important materials used in the manufacture of gas.

Elect Directors for 1922

Directors for the year 1922 were elected by the stockholders of the Boise (Idaho) Gas Light & Coke Company at their annual meeting, as follows: Charles Theis, Spokane; William Stoehr, Boise; William H. Davies, St. Louis; Willis Ridley and Joseph H. Brewer, Grand Rapids.

New Weekly

The Industrial Digest is a new weekly which abstracts the informative articles from nearly 600 leading trade and technical publications. It is designed to save time and trouble for the busy executive, and is published by the Periodical Digest Corporation, 25 West Forty-fifth Street, New York City.

Gas Cases Off Until April 19

Hearings in all natural gas rate cases from the Pittsburgh district scheduled for March 22 have been continued until April 19 by the Public Service Commission at Harrisburg, Pa. It is understood that other western Pennsylvania gas cases will be held at about the same date.

THE COLUMBUS FOUNDRY COMPANY, manufacturers of pipe, has been consolidated with the W. L. Lemley Foundry Company, of Bessemer, Ala., and the entire equipment of the Columbus plant will be moved to Bessemer, it has been announced by C. H. Cox, president of the Columbus company. The plant at Bessemer will be enlarged and improved.

Injunction Remains in Effect Pending Decision of U. S. Supreme Court

Atlanta, Ga.—As injunction cases always are given precedence over other cases appealed to the United States Supreme Court, officials of the Georgia Railway & Power Company and the Atlanta Gas Light Company state that they expect the high tribunal to give its decision in regard to the Atlanta gas rate case by the early part of next fall. The appeal to the Supreme Court has been allowed and the necessary details completed by the attorneys representing the Atlanta company. In the meantime the restraining order prohibiting the Georgia Railroad Commission from enforcing the lower rates ordered some time ago and effective from Jan. 1, 1922, remains in effect. The injunction originally was granted temporarily by the Federal court here and later extended pending the outcome of the case. Amount of the company's bond to indemnify customers of the gas company in event the Supreme Court upholds the decision of the lower court and dissolves the injunction, has been fixed at $100,000, and this bond was made before the appeal to the high tribunal was taken.

Natural Gas May Be Piped to Denver and Adjacent Cities

Denver, Col.—On March 1, the Rocky Mountain Gas Company, a subsidiary of the Ohio Oil Company, secured from the State Public Service Commission at Cheyenne, a certificate of convenience and necessity for building a pipe line to convey natural gas from the Mahomey Dome to Rawlins, Wyo.

The Mahomey Dome is located thirty miles north of Rawlins, and the estimated cost is $400,000, with the pipe line complete. There would be a possible supply of natural gas to the city of Rawlins of 1,500,000 cu. ft. daily.

The movement mentioned is believed to be the first step toward bringing the Mahomey Dome gas into Cheyenne, Denver and intermediate cities.

The present charge for artificial gas at Cheyenne is $1.85 a thousand cubic feet. At Denver the charge is $1 a thousand. It is stated that the natural gas can be supplied to all cities "piped" along the line mentioned, at 50 cents a thousand cubic feet.

Let us hope that it may come true, because it will not only mean many happy housewives, a great saving of money to those needing such a beneficence, but it will mean the biggest business of gas appliance utensils the Rocky Mountain regions ever knew.

William H. Bradley Memorial Presented at Meeting of Society of Gas Lighting

At the meeting of the Society of Gas Lighting held on March 9, the committee appointed by President Strecher to prepare a resolution respecting Mr. Bradley presented the following memorial:

William H. Bradley, chief engineer of the Consolidated Gas Company of New York, passed away on Wednesday, the eighteenth day of January, 1922, in his office, while actively devoting himself to the customary daily duties which he had exercised in that company since its incorporation in 1884.

Mr. Bradley had been connected with companies closely affiliated with the gas industry for over half a century, and was one of the oldest members of the Society of Gas Lighting, having been elected on Dec. 14, 1893.

Mr. Bradley's generous nature and kindly regard for his associates in the gas profession found expression in freely sharing the knowledge gleaned from his great experience in conducting the largest gas operations in this country, and this trait, in combination with his rugged and sterling character, quite aside from his engineering genius, contributed to the formation of an affectionate regard for "Chief Bradley" that was universal throughout the profession, and was particularly true in the case of the members of this society to which he was more closely attached than any other.

Mr. Bradley had a remarkable ability to sense intuitively the correct solution of a problem which contributed largely to the success of his many business undertakings and which inspired the unstinted admiration of the rank and file of his profession, both at home and abroad, for his remarkable engineering genius.

Whereas, His comrades in the society to express the deep sorrow they feel in the loss of their associate, and to pay a simple loving tribute to his memory that will be in keeping with his fine character and his regard for his personal and professional associates, it is therefore

Resolved, That these resolutions be spread in full upon the minutes of the society, and that the secretary be instructed to transmit a copy of these resolutions to Mr. Bradley's wife and family.

W. R. Addicks,
Alexander C. Humphreys,
Alfred E. Forstall.

Gas Company Asks Increase in Valuation

Kansas City, Mo.—The Kansas City Gas Company has filed a petition before the Public Service Commission in Jefferson City asking to increase its valuation $350,000, the amount of improvements added by the company since the valuation of $9,700,000 made by the commission in 1919, according to C. W. Green, vice-president of the company.

The petition stated the returns of the gas company for the last year were less than 8 per cent.

Mr. Green said the petition filed before the service commission recently by the Citizen's Protective League and the Chamber of Commerce of Kansas City, through the city counselor's office, which asks elimination of the 50-cent minimum service rate charged to consumers by the gas company, did not cause the filing of the company's petition.

A. G. A. Window-Display Book

The American Gas Association has just issued a very attractive book containing a varied collection of ideas for window displays of gas merchandise, and is the result of careful selection of the best ideas they have been able to secure.

It is intended as a service, and member companies are priviliged to borrow any of the additional photographs which have not been used in the book and which make up a collection covering every type of gas window display.

Included in the displays illustrated in this book are, Gas Cooking Displays, Gas in the Kitchen, Gas Laundry Displays, Gas Lighting Displays, Hot Water Displays, Gas Heating Displays, Seasonable Displays, Canning Time Displays, Patriotic Windows Displays, and Industrial Displays.

These books are offered at $2 each, delivered.

Program for Wisconsin Gas and Electrical Convention

The Wisconsin Gas Association and the Wisconsin Electrical Association will hold their joint meeting on Wednesday and Thursday, March 22 and 23, at the Hotel Pfister, Milwaukee, Wis. Both associations begin their sessions on Wednesday morning.

The program for the gas sessions and joint sessions is as follows:

Wisconsin Gas Association

Wednesday, March 22

Registration at the seventh-floor headquarters.

10.00 A. M. — Business session — South Room, seventh floor.
Reports.
President's address.
Appointment of committees.
Special business.
Announcements.

12.30 P. M. — Fern Room, seventh floor.
Luncheon by groups discussing manufacture, distribution and commercial work.

2.00 P. M. — Technical session — South Room, seventh floor.
"The Removal of Naphthalene from Manufactured Gas," A. W. Pesch and O. L. Kowalke.
"The Use of Sodium Hypochlorite for the Removal of Sulphur Compounds from Gas," H. R. Broker and O. L. Kowalke.
"Some Tests with the Brady B.t.u. Indicator," O. L. Kowalke, University of Wisconsin.
"Merchandising via Service," A. E. Gerg, Eastern Wisconsin Electric Company, Fond du Lac.

2.30 P. M.—Parallel auditing session—Parlor D, sixth floor.
Leader, C. E. Kohlhepp, Wisconsin Public Service Company, Milwaukee.

Thursday morning, March 23

9.30 A. M.—Technical and business session — South Room, seventh floor.
"Outside Gas Producers at Racine," H. R. Broker.
Round-Table Discussion on Meter Practice. Leader, D. A. Powell.
The 2 Per Cent Accuracy Requirement.
Frequency of Routine Tests.
Costs and Results of Testing and Repairing Gas Meters.
Business session.

Wisconsin Gas Association
Wisconsin Electrical Association

Thursday afternoon, March 23

2.00 P. M. — Joint session — Red Room, seventh floor.
"Valuation of Public Utilities for Taxation," Edmond J. Brabant, Public Utilities statistician, Wisconsin Tax Commission.
"Controlling Elements in Rate Making," Commissioner Lewis E. Gettle, Railroad Commission of Wisconsin.
"The Wisconsin Public Utilities Bureau," Frantz Herwig, director.

Joint Assembly and Banquet

Seventh floor, Hotel Pfister

Banquet tickets and reservations should be secured at the registration desk as early as possible.

6.30 P. M.—Assembly.

7.00 P. M.—Banquet—Fern Room —Informal.
Toastmaster, Phil A. Grau, executive director, Milwaukee Association of Commerce.
Music, Ray Reynolds with all-star troup of musicians and singers.
Brief wireless telephone demonstration, through courtesy of Julius Andrae & Sons Company.
Banquet Speaker, M. S. Rice, Detroit, Mich.

Officers

The officers of the Wisconsin Gas Association are, President, J. P. Pulliam; vice-president, Roy S. Meredith; secretary-treasurer, Henry Harman, and the convention committee consists of S. B. Sherman, chairman; Roy S. Meredith, Henry Harman, A. F. Davey. Registration committee, C. Ewing, chairman; G. S. Zidler, John N. Cadby.

Gas Rates Cut in Wisconsin

Madison, Wis.—Gas rates charged by the Wisconsin-Minnesota Light & Power Company, operating in the cities of Chippewa Falls and Eau Claire, have been ordered reduced by the Railroad Commission. The cut amounts to 15 cents per thousand cubic feet for the first step of the rate schedules.

Natural Gas Convention Will Exhibit Gas Appliances of Every Description

One of the most interesting features for the general public in the annual meeting of the Natural Gas Association of America, which is to be held at Kansas City, Mo., May 15, 16, 17 and 18, is the exhibit of the natural gas supply men, showing appliances of every description in the gas field. While some of these exhibits are in the nature of heavy machinery, such as drilling machines, etc., and mostly of interest to the men in the industry, nevertheless there are many booths where the housewife will be intensely interested, owing to their showing the various ways in which economy can be practised in heating, lighting and cooking, the three important parts of housekeeping that require attention. At last year's convention in Cincinnati many thousands of people visited the exhibition hall every day, and many of them went away with new ideas along the line of conservation.

In a recent issue of *Natural Gas*, the official journal of the Natural Gas Association of America, an article on "The Gas-Saving Department" appears, from the pen of N. McManamy, sales manager of the Kansas City Gas Company, in which he says, "We believe that it is a good idea to cultivate the goodwill of the public, and in developing this we occasionally give space in our salesrooms to organizations of different kinds and encourage exhibitions that are of general interest to the public. We gladly give the use of our windows to the Salvation Army to serve doughnuts to the soldier boys, or the Boy Scouts to give an exhibit showing their various activities. We do not feel that there is anything novel or original in any of the things we are doing—just a continual hammering on the use of efficient gas appliances, and a field that is just barely touched, accounts for our increasing sales."

Mr. McManamy hits the nail on the head about a field barely touched, that of educating the public along the lines of the proper use of gas by adjustment of gas-burning appliances, forward movement along this line. There is no question of the general public being attracted to the big gathering in Kansas City.

A. G. A. Proceedings for 1921

We are glad to announce that the 1921 proceedings will be ready for distribution on or about Apri 15 at prices which only cover actual cost of paper, press work and binding. Price includes delivery. Postage accepted:

General proceedings	$1.00
Accounting section proceedings	1.00
Commercial section proceedings	.50
Technical section proceedings	2.00

The above prices are made possible through a ruling of the executive board and are a substantial reduction over the prices charged for previous proceedings. This is in line with the policy of the association to make the proceedings available to the members at the lowest possible cost.

The 1921 proceedings cover the entire activity of the association during the year, all committee reports, papers and discussions presented at the annual convention and other general information.

Prompt attention will be given to all requests for the 1921 proceedings.

Royalties on Oil and Gas from Government Lands Were Over $2,000,000 in 1921

Washington, D. C.—Over $2,000,000 was paid into the United States Treasury in the calendar year 1921 as the result of royalties accruing from the production of oil and gas on Government-owned lands in the West under the terms of the leasing act of Feb. 25, 1920, states A. W. Ambrose, chief petroleum technologist of the Bureau of Mines, in his annual report to the director of the bureau. More than 6,000 permits for prospecting for oil and gas have been issued by the General Land Office, while 267 leases have been granted for producing oil and gas properties.

A statistical statement, summarizing the result of approximately 80 per cent of all reports of production in 1921, shows a total of 8,641,159 bbl. of oil produced on Government-owned lands. Of this, 5,113,073 bbl. are credited to Wyoming; 2,923,592 to California; 600,153 to Montana, and 4,340 to Louisiana. Production of natural gas amounted to 3,856,618,000 cu. ft., of which 3,665,036,000 is credited to Wyoming and 191,582,000 to California. Casinghead gasoline production amounted to 1,918,722 gal., Wyoming producing 1,547,177 gal. and California 344,929 gal.

The Government receives royalties on all petroleum and natural gas and their products sold from Government lands. The minimum oil royalty rate of 5 per cent is that for land leased as a reward for discovery. Most of the leases have been awarded under a sliding scale of royalties ranging from 12½ to 25 per cent. Natural gas royalties charged by the Government range from 12 1/2 to 16 2/3 per cent The rate on casinghead gasoline is 16 2/3 per cent of the value of the gasoline extracted from the gas produced and sold.

Proceeds of Stock Issue to Be Used for Improvements

Los Angeles, Cal.—The Los Angeles Gas & Electric Corporation has received permission from the State Railroad Commission to sell 20,000 more shares of preferred stock for $85 a share on par value of $100. The return is 6 per cent on par, which at the rate of sale brings 7.05 per cent.

A prior issue of 30,000 has practically all been sold, according to officials of the company, mostly over the counter and by mail from consumers.

This will make a total issue at this time of 50,000 shares at a par value of $5,000,000, the proceeds of which are being put into extensions and betterments.

The total estimated expenditures for the year 1922 are given at $7,835,410.

Gas Merger Approved

Boston, Mass.—The purchase of the East Boston Gas Company and the Newton & Watertown Gas Company has been approved by the State Department of Public Utilities. In announcing its decision the department states that the facilities for supplying gas by the combined companies will not be diminished and that the plan is consistent with the public interest.

Plan Construction of Plant

Robertsdale, Ala.—The Sanford-Seever Orchard Company, of Robertsdale, is planning the construction of a gas-producing plant the early part of this year. A 16,000-gal. tank is to be installed.

Southern Counties Gas Plans Extensive Improvements in 1922

Los Angeles, Cal.—The capital budget of the Southern Counties Gas Company for the year 1922, according to word received from the headquarters of that company here, will run close to the million and one-half mark. This figure, practically the same as the budget of 1921, includes all betterments and improvements which will be required during the current year.

This large amount of money will be expended over the entire system, each of the eight districts on the company's system receiving a part of the expenditure. The territory served by this gas company is growing so rapidly, population is increasing in such numbers that the company is making history in keeping up with this normal growth. Cities such as Long Beach, Santa Ana, Pomona and the "sun-kist" valley cities adjoining Pomona, Monrovia, Santa Monica, Santa Barbara, are developing at an unprecedented rate.

The territory embracing the Southern Counties system includes some forty-odd cities in Los Angeles, Orange, San Bernardino, Ventura and Santa Barbara Counties. This rapidly developing section of southern California forms an empire in itself. It is divided into eight districts by the company, as follows: Orange County, Whittier, Pomona, Monrovia, Long Beach, Santa Monica Bay, Santa Barbara and Ventura County districts. Each district is in charge of a district superintendent.

Capital expenditures in these districts for 1922 are as follows: Orange County, high-pressure lines, low-pressure mains, transmission lines, extensions and replacements, $26,750; Whittier, high and low pressure lines, 25 large industrial meters and retulators to supply oil well consumers, and miscellaneous expenditures, $90,090; Pomona, transmission lines, high and low pressure mains, regulators, replacements and reinforcements to the system, $32,660; Monrovia, transmission and distribution mains, regulators, new office building, garage and storeroom, replacements, and miscellaneous expenditures, $50,540; Long Beach, replacements to minimize leakage, distribution mains, twenty-five large industrial meters and regulators to supply drilling wells in

the Signal Hill oil fields, 250 h.-p. water tube boiler at compressor plant, steam driven compressor, and other betterments, $83,600; new two million cubic foot gas holder at gas plant, steam driven compressor, new storeroom at Venice, additions to Venice office, remodeling buildings, reinforcement of distribution system, and other expenditures, $300,000; Santa Barbara, extensions and replacements, auxiliary generator equipment at the plant where artificial gas is generated, more than $20,000; and Ventura County, replacements, four miles of four-inch transmission line for carrying gas supply from city of Ventura to Oxnard, extensions and other additions, $31,140.

In addition there is the new Los Angeles central warehouse, located in the heart of the industrial part of the city, $60,000, and a number of other items, bringing the 1922 capital budget to a point between $1,370,520 and $1,500,000.

The gross earnings during 1921 increased $1,345,665.94 over the 1920 gross earnings, the year's total being $4,251,023.80. The company sold about 9,000,000,000 cu. ft. of gas, and engineers for the company estimate that the 1922 gas send-out will run in excess of 13,000,000,000 cu. ft. The company expects to add more than 12,000 meters to its system this year, which will bring the total number of meters close to the 100,000 mark.

The above figures and estimates indicate, according to the company, that the Southern Counties Gas Company is keeping pace with the great strides being made by Los Angeles and its contiguous territory.

Will Construct New Pattern Shop

Birmingham, Ala.—A large new pattern shop is to be constructed here by the American Cast Iron Pipe Company, near the company's main plant at Sixteenth and Thirtieth Avenues. The American company is one of the largest manufacturers of cast-iron pipe in the South.

CONSOLIDATED GAS, ELECTRIC LIGHT & POWER COMPANY, of Baltimore, Md., declared regular quarterly dividends of 2 per cent on common and preferred, both payable April 1.

Cities Service Company and Carson Petroleum Make Working Arrangement

Henry L. Doherty & Co. and Cities Service Company, who own and control Empire Refineries, Inc., Crew Levick Company and Empire Gas & Fuel Company, with the large mid-continent production and holdings of the latter company, announce that they have entered into a working arrangement for a period of years with the Carson Petroleum Company which gives Cities Service Company interests first call on the export facilities of the Carson Petroleum Company.

The Carson Petroleum Company has just completed one of the most modern export plants in the world, located in the port of New Orleans. This terminal includes approximately 1,000,000 bbl. of steel tankage with pipe line and pumping equipment for loading tankers at rate of approximately 2,500 bbl. per hour, together with complete casing, canning and barreling facilities with a capacity for manufacturing, filling and loading aboard ships approximately 10,000 cases and 1,500 wood or steel barrels of petroleum products daily. The plant is equipped throughout with a complete modern conveying system for handling empty and filled packages from the point of manufacture and filling over the company's own docks into a ship's hold.

This working arrangement, together with the large production and refining facilities of the Cities Service Company interests, places these companies in a position to do a world-wide trade on an equal footing with any other organization in the oil business and will also enable the mto increase the operations of their refineries in the mid-continent field at the same time adding materially to the Carson Petroleum Company's source of supply and placing the company in a position to expand both its domestic and export business.

The Petty's Island plant of Crew Levick Company at Philadelphia has been taking care of the high-grade lubricating products of Cities Service Company for export, and with these additional facilities at the Gulf, Cities Service Company interests will be in position completely to cover the needs of their foreign customers and at once. This arrangement is an ideal one for both Cities Service Company and Carson Petroleum Company.

Colorado Gets a Real Shale-Oil Plant

Denver, Col.—Colorado has been given her first commercial shale oil manufacturing plant, fourteen miles north of Debeque, at a cost of $300,000. The name of the new plant is Index City, and it is owned jointly by Eastern and Colorado capitalists.

Harry L. Brown, of Newark, N. J., inventor of the Brown process and retort for handling shale oil, says:

"The new plant is good for over 100 bbl. a day and the great value to the State of developing the widespread oil-shale properties on the western slope and the consequent increase in machinery manufacture and employment is being appreciated by many business men.

"Everyone who has studied the matter at all now knows that the supply of oil from well fields is fast diminishing, and many realize that in Colorado alone there is enough oil in oil shale to supply the country's needs for 400 years.

"Eastern business men are growing enthusiastic over the oil-shale possibilities on the western slope in Colorado and I predict that this will be one of the States greatest industries before many years.

"The Brown retort, which is a horizontal revolving tube in three sections, each section twenty feet long and thirty inches in diameter, little if any refining is necessary to bring the oils obtained into purified form for commercial use. The process produces a complete paraffin group of oils, from high-test gasoline down to lubricating oils and paraffin, and also brings out all the products of ordinary coal tar, the phenols, medicinal oils, and aniline dyes. Besides these are many other by-products, the extraction of which has not been fully developed."

An invitation has been extended to many Colorado capitalists and engineers to visit the plant, a special run to be made, during their visit, to prove the value and efficiency of the work.

Authorizes New Gas Stock Issue

Boston, Mass.—The Public Utilities Department has authorized the Malden & Melrose Gaslight Company to issue stock to the amount of $651,700 for improvements and additions to its present plant. The date of the sale of the stock will be announced later by the company.